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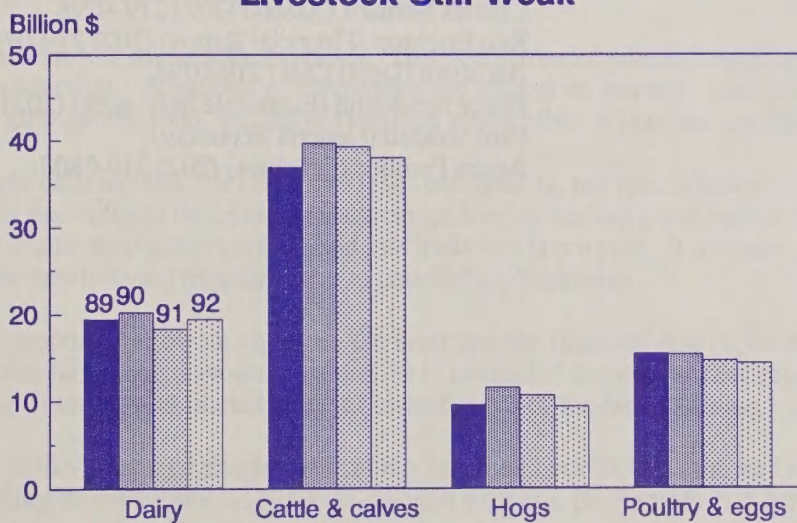
Economic  
Research  
Service

AFO-45  
May 1992

# Agricultural Income and Finance

## Situation and Outlook Report

### Dairy Receipts Recovering But Other Livestock Still Weak



1992 forecast.

**Agricultural Income and Finance Situation and Outlook.** Agriculture and Rural Economy Division, Economic Research Service, U.S. Department of Agriculture, May 1992, AFO-45.

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# Summary

## 1992 Cash Incomes Raised From April

Production expenses have eased and Government payments have increased from April forecasts, raising net cash income to a projected \$51-58 billion from \$49-55 indicated earlier.

Wheat cash receipts are recovering soundly from 2 years of decline. Prices and production are projected up, boosting wheat cash receipts 25-30 percent higher this year. Although rice receipts are forecast down, total cash receipts from food grains are projected to be the highest in 7 years. Corn and soybean receipts are expected to decline about 1 percent from a year earlier.

Fruit and nuts make up the only other major crop sector likely to realize higher receipts in 1992. Production has recovered from the freeze-damaged 1991 Washington and California crops and prices are above trend. Cash receipts

from fruit and nuts will likely be a record \$10 billion plus.

Red meat and poultry receipts are forecast down, with cattle and calf receipts off 4 percent from 1990's record. Hog prices near breakeven will lower returns to producers. In contrast, increasing prices likely will raise dairy receipts above all but the last 3 years.

Deficiency and diversion payments are forecast down 10 percent for 1992. However, higher conservation and disaster payments will lead to an overall increase in Government payments.

Production expenses are forecast up 2 percent in 1992, although outlays for farm-origin inputs are expected to fall. Fuel expenses may increase 5 percent, but hired labor will take the biggest bite, with expenses rising about \$1 billion in 1992.

Of the major U.S. production regions, only the Northeast is forecast to have

higher cash receipts this year, based mainly on increased returns from dairy and fruit production. Higher cash expenses, however, are expected to lower net cash income 1-2 percent in the Northeast, the smallest decline of any region.

Farm asset values (excluding operator households) are forecast to rise no more than 1 percent during 1992 from \$846 billion in 1991. The total value of U.S. farm real estate is forecast to remain unchanged with most of the asset value increase coming from nonreal estate assets. Farm debt rose slightly in 1991 after 6 consecutive years of debt reduction, and is projected to rise again in 1992.

A general economic recovery may increase domestic demand for agricultural commodities. Moreover, continued low inflation and interest rates will help minimize increases in farm expenses.

## GLOSSARY OF FARM INCOME AND FINANCE

*Net cash income*—is the sum of cash receipts, farm related income, and direct Government payments minus cash expenses. This cash-based concept measures the total income farmers receive in a given year, regardless of the year in which the marketed output was produced. It indicates the availability of funds to cover cash operating costs, finance capital investments and savings, service debts, maintain living standards, and pay taxes.

*Net farm income*—is the gross farm income minus total expenses. This accrual-based concept measures the profit or loss associated with a given year's production. Additions to inventories are treated as income. Nonmoney items such as depreciation, the consumption of farm-grown food, and the net imputed rental value of operator dwellings are included.

*Net cash flow*—is the sum of: gross cash income, the change in loans outstanding, net rent to nonoperator landlords, and the net change in farmers' currency and demand deposits; minus gross cash expenses and gross capital expenditures. This financial indicator measures cash available to farm operators and landlords in a given year. It indicates the ability to meet current obligations and provide for family living expenses, and to undertake investments.

*Debt/asset ratio*—measures both proportional owner equity in the farm and the financial risk exposure of the operation (the extent to which the farm's assets have been borrowed against). It is calculated as total debt outstanding as of January 1, divided by the farmer's estimate of the current market value of owned assets of the farm business.

*Farm Costs and Returns Survey*—USDA's annual enumerated survey sampling over 26,000 farm and ranch operations in 48 states. The FCRS is a probability based survey that collects detailed expense, production, and demographic data on U.S. agriculture.

*Equity level*—measures net worth. It is the hypothetical balance that would remain from the sale of assets and paying off existing debt. It is calculated as sector assets minus sector debt outstanding.

*Current and inflation-adjusted dollars*—Adjustments for the effects of inflation are made where indicated. Adjusted figures use the 1987 Gross Domestic Product (GDP) deflator as a base and are interchangeably referred to as real, constant dollar, or inflation-adjusted.

## Weak Hog and Cattle Prices Hampering 1992 Receipts

*A \$500-million increase in 1992 crop receipts, mainly from wheat and fruit, will not be enough to cover lower beef and hog receipts, leading to lower total cash receipts and incomes.*

---

Three months ago, farm financial forecasts were pointing to some recovery in grain production in 1992, but much lower livestock prices, causing overall receipts to drop from 1991. This is still the case, with 2-percent lower livestock receipts offsetting 1-percent higher crop receipts. Expenses are forecast up 2 percent, leaving net cash incomes at \$51-58 billion, down 4-6 percent from 1991 and 10-12 percent below 1990's record high. Net farm income of \$37-45 billion shows little change from 1991 as \$2 billion in inventories are held over for next year.

### ***Wheat Is a Major Factor in Higher '92 Crop Receipts***

Wheat cash receipts are recovering strongly after 2 years of decline. High worldwide wheat production in 1990 and 1991 held U.S. prices in check. This and a poor 1991 U.S. crop pushed 1990 and 1991 wheat receipts down. For 1992, prices are up over 25 percent from last year due to strong exports and tight supplies. Production is projected up 14 percent. This is forecast to boost wheat receipts 25-30 percent to 1989's record. While rice receipts are forecast down somewhat for the year, total food grain receipts are forecast to be the highest in 7 years.

Receipts for the other major field crops are forecast down this year. Corn and soybean receipts appear to be down about 1 percent, while cotton, affected by record world production for 1991/92, feels the effects of much lower prices in calendar 1992. Cotton cash receipts were record high each year since 1988, but for 1992 will probably fall back to 1989's level, still high by historical standards.

Except for wheat, the only major crop sector likely to see higher 1992 receipts is fruits and nuts. In 1991, the California citrus crop and the Washington apple crop suffered severe freeze damage. Prices soared but few, if any, fruit were on the market. For 1992, production has recovered and prices are above recent trends, which will likely push fruit and nut receipts to a record \$10-12 billion.

### ***Livestock Receipts Continue To Decline***

Red meat and poultry receipts are forecast down again this year. Indications are that beef and hog production will both rise in 1992, causing downward pressure on prices. Cattle and calf receipts, while down 3 percent for the year and 4 percent from 1990's record, are still higher than in any year prior to 1990. Hog producers, however, are likely to see prices at or below breakeven. The profitability of these operations will depend to a large degree on enterprise mix. Crop receipts, if available, may temper declines in hog receipts.

Dairy prices fell in August 1990 and remained low through most of 1991. For 1992, prices are forecast up somewhat with receipts recovering to 1989 levels. Dairy receipts ranging from \$17 to \$21 billion will be approaching the record levels of 1989 and 1990.

### ***Disaster Assistance Causes Government Payments To Rise***

Direct cash payments had been declining each year from 1987's high of \$16.7 billion. For 1992 deficiency and diversion payments are still declining. Higher wheat prices are lowering food

grain deficiency payments more than \$1 billion, while lower cotton prices are raising cotton payments slightly. Overall, commodity program payments are forecast down 10 percent for this year. However, conservation payments are forecast to rise nearly \$500 million, and \$995 million in disaster payments have been allocated for 1990 and 1991 crop losses. This leaves 1992 direct payments at \$8-9 billion, up 7-8 percent from 1991.

### ***Marginal Rise in Expenses***

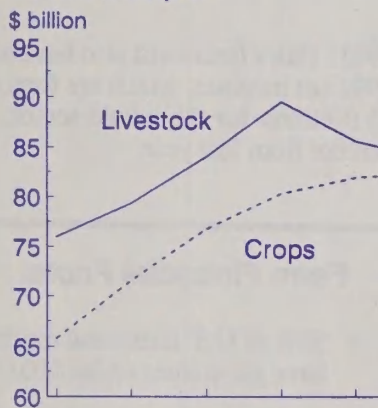
Production expenses are forecast up 2 percent, slightly less than the rate of inflation for the general economy. Farm-origin input expenses are expected to fall as feed expenses remain unchanged from last year, feeder livestock expenses fall 4 percent, and seed expenses rise 2 percent. Lower feed prices are offset by an increase in livestock production. Feeder cattle and feeder pig prices have dropped, and planted crop acreage is unchanged with only slightly higher seed prices for small grains.

The prices paid index for fertilizers is unchanged for 1992, which with no change in planted acres, is forecast to keep fertilizer and chemical expenses at or only slightly above last year. Fuel prices have rebounded somewhat this year, raising fuel expenses 5 percent.

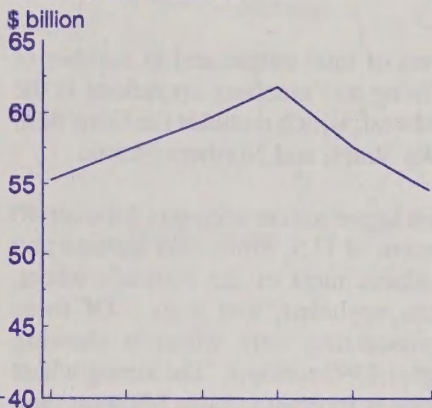
The largest expense increase, both in terms of percent and dollars, is for hired labor. For both 1990 and 1991, hired labor expenses rose \$1 billion. The same is forecast for 1992 as wage rates continue to rise, along with the production of labor-intensive crops like fruits and vegetables.

*Declining hog and cattle cash receipts are lowering total net incomes.*

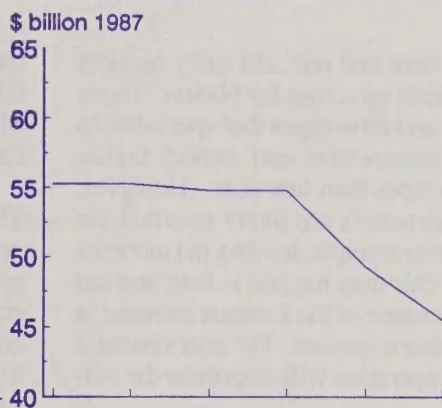
**Cash Receipts**



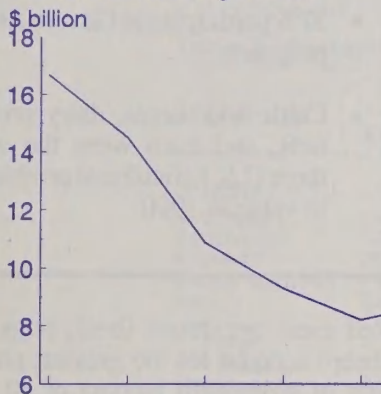
**Net Cash Income**



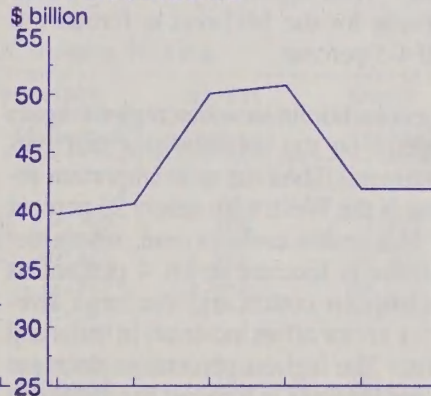
**Real Net Cash Income**



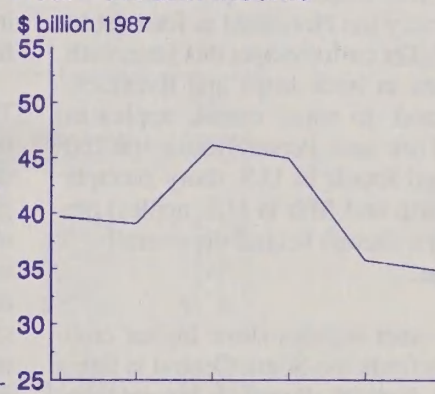
**Government Payments**



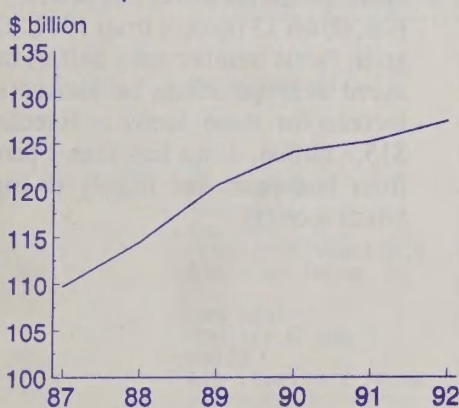
**Net Farm Income**



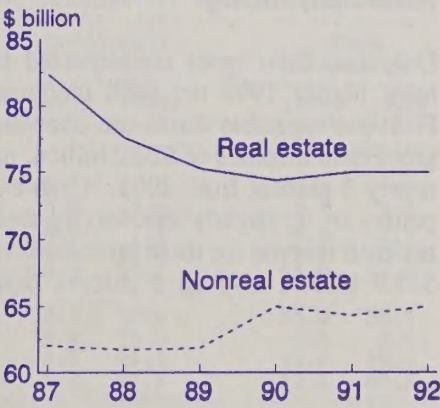
**Real Net Farm Income**



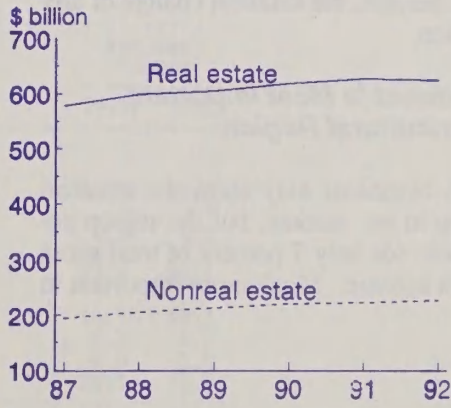
**Cash Expenses**



**Farm Debt**



**Farm Assets**



1991-92 forecast.

## **Net Cash Incomes Down in All Major Regions**

*Despite higher gross cash income in the Northeast, higher expenses are causing net incomes to fall in all regions.*

Wheat, fruit and nut, and dairy receipts are forecast up across the Nation. Those regions and farm types that specialize in these commodities can expect higher cash receipts than last year. However, higher expenses are likely to offset the increase in receipts, leaving net incomes down. This may happen to fruit and nut farms because of the forecast increase in hired labor expenses. The cost structure of each operation will determine the outcome.

### ***Dairy and Fruit Sectors Assist Northeast***

Of the five major U.S. production regions, only the Northeast is forecast to have higher cash receipts this year, with increases in both crops and livestock. Dairy and, to some extent, apples in New York and Pennsylvania (ranked third and fourth in U.S. dairy receipts and fourth and fifth in U.S. apples) are the major factors behind the overall increase.

While other regions show higher crop receipts (only the South Central is forecast to decline), livestock receipts are forecast to rise only in the Northeast. Cash expenses, however, are showing the largest percentage increase in the Northeast, lowering net cash incomes 1-2 percent, the smallest change of any region.

### ***Midwest Is Most Important Agricultural Region***

The Northeast may show the smallest drop in net income, but the region accounts for only 7 percent of total gross cash income. Much more important in

terms of total output and in number of farming and ranching operations is the Midwest, which includes the Corn Belt, Lake States, and Northern Plains.

This larger region accounts for over 40 percent of U.S. gross cash income and produces most of the Nation's wheat, corn, soybeans, and hogs. Of these commodities, only wheat is showing higher 1992 receipts. The strong wheat sector is forecast to raise Midwest crop receipts slightly (less than 1 percent), but the decline in other commodities, particularly hogs and beef, will likely cause total receipts to fall about 1 percent. With higher expenses, net cash income for the Midwest is forecast to fall 4-5 percent.

The conditions in other regions again depend on the commodities that predominate. The next most important region is the West, with nearly 25 percent of U.S. gross cash income, where net income is forecast down 4 percent as declines in cotton and the large livestock sector offset increases in fruits and nuts. The highest percentage decrease in net incomes is forecast for the South Central region, primarily from declining cotton and rice receipts.

### ***Fruit/Nut/Vegetable and Dairy Farms Improving***

Only two farm types are expected to have higher 1992 net cash incomes. Fruit/nut/vegetable farms are showing gross cash incomes of \$20.2 billion, up nearly 5 percent from 1991. Cash expenses are up slightly less, leaving total net cash income for these operations of \$11.7 billion, also up 5 percent from

1991. Dairy farms will also have higher 1992 net incomes, which are forecast at \$5.0 billion for the whole sector, up 5 percent from last year.

### **Farm Financial Facts. . .**

- 50% of U.S. farms and ranches have gross sales under \$10,000
- 48% have no debt
- 60% specialize in livestock or dairy
- 37% participate in Government programs
- Cattle and calves, dairy products, and corn were the top three U.S. agricultural products in value in 1990

Red meat operations (beef, hogs, and sheep) account for the greatest proportion of gross cash income of all farm types, followed closely by cash grain farms. However, expenses take a larger amount of red meat income than cash grain income. Net cash income for red meat operations is forecast at \$12.3 billion, down 13 percent from 1991. Cash grain farms number only half as many as red meat operations, but total net cash income for these farms is forecast at \$15.7 billion, down less than 1 percent from last year, due mainly to higher wheat receipts.

## U.S. Regions

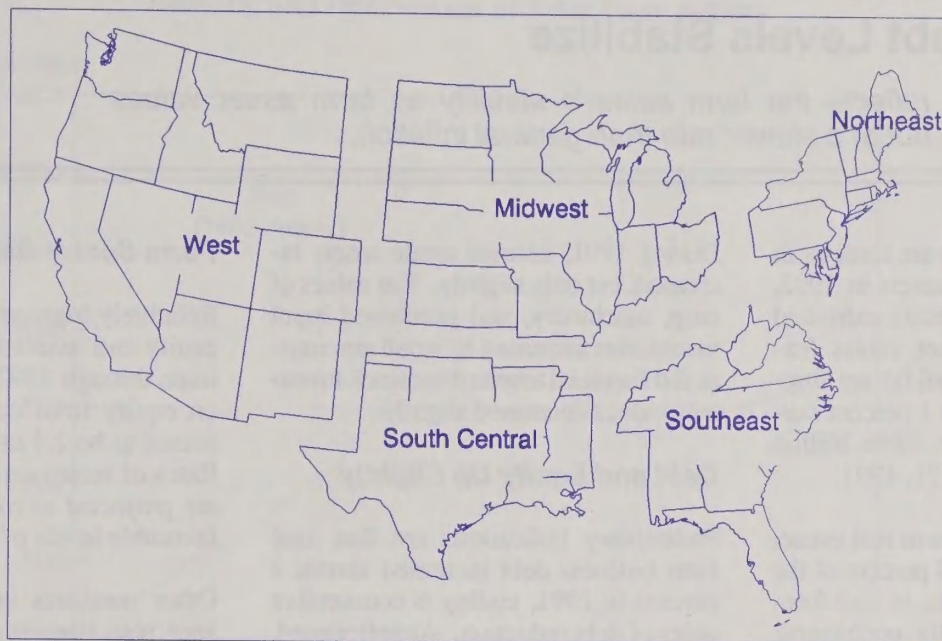


Table 1--Regional cash incomes falling

Region	Cash receipts		Direct Government payments	Gross cash income	Cash expenses	Net cash income
	Crops	Livestock				
Million dollars						
1991F						
Northeast	4,518	7,106	126	12,158	7,992	4,166
Southeast	14,470	12,738	509	29,485	17,371	12,114
Midwest	29,809	37,146	4,734	73,959	54,572	19,387
South Central	9,221	13,555	1,643	25,532	17,820	7,712
West	24,802	14,662	1,447	42,267	27,760	14,507
1992F						
Northeast	4,511	7,121	134	12,168	8,234	3,934
Southeast	14,446	12,617	604	29,436	17,859	11,577
Midwest	29,615	36,614	4,933	73,384	55,778	17,606
South Central	9,233	13,346	2,083	25,768	18,214	7,554
West	24,973	14,496	1,646	42,444	28,558	13,886

F = forecast.

Table 2--Cash income and expenses for selected farm types

Farm type 1/	Gross cash income		Cash expenses		Net cash income	
	1991F	1992F	1991F	1992F	1991F	1992F
Billion dollars						
Cash grain	42.4	42.9	26.6	27.2	15.8	15.7
Tobacco	3.7	3.6	2.7	2.8	.9	.7
Cotton	8.0	7.2	3.6	3.7	4.3	3.5
Fruit/nut/vegetable	19.4	20.2	8.3	8.6	11.1	11.7
All crop farms	89.7	90.2	56.2	57.8	33.5	32.4
Red meat	52.1	50.4	38.0	38.1	14.1	12.3
Poultry & egg	13.6	13.5	8.5	8.6	5.7	4.9
Dairy	23.5	24.1	18.7	19.0	4.8	5.0
All livestock farms	93.2	91.9	69.1	69.7	24.1	22.2

F = forecast. 1/ Farm types are defined as those with at least 50 percent of the value of production accounted for by a specified commodity group.

## Asset and Debt Levels Stabilize

*The balance sheet reflects the farm sector's stability as farm asset values continue increasing, but at a slower rate than general inflation.*

Only very small changes are forecast in the total value of farm assets in 1992, continuing the asset stability exhibited during 1991. Farm asset values (excluding operator households) are forecast to rise no more than 1 percent during 1992, up from the \$846 billion estimated for December 31, 1991.

The total value of U.S. farm real estate, which now comprises 74 percent of the total value of farm assets, is also forecast to remain essentially unchanged. Any small increases in the per acre value of farm real estate will likely be offset by slightly fewer acres of land in farms. With the current 3-percent annual rate of inflation, unchanging asset values imply further erosion in the real (inflation-adjusted) value of farm sector assets. The real value of farm assets has generally declined since peaking in 1980. (Only 1987 was an exception, when the real value of farm assets increased slightly.) The real value of farm assets is now the lowest since 1962.

Nonreal estate asset values are expected to increase about 2 percent in 1992. The values of livestock, machinery, and financial assets are expected to increase. Crop inventory values may decline slightly and inventory values of purchased inputs are expected not to change.

### **Farm Asset Values Declined Slightly in 1991**

Farm asset values declined from \$850 billion to \$846 billion. The real estate component accounted for most of the decline (down from \$628 billion to \$622 billion), with the remaining reduction attributable to livestock. The percentage changes in the total value of farm real estate were remarkably consistent across the country. The largest increases in total real estate values occurred in the Corn Belt and Appalachian regions. The Delta and Southeast incurred the largest regional declines.

During 1991, nonreal estate assets increased, but only slightly. The values of crop, machinery, and purchased input inventories increased by small amounts, as did financial assets. Livestock inventory values decreased slightly.

### **Debt and Equity Up Slightly**

Preliminary indications are that total farm business debt increased almost 2 percent in 1991, ending 6 consecutive years of debt reduction. As anticipated, the slowdown in the recovery of the agricultural economy did not produce a substantial change in new loan demand. Farmers and lenders, while cautious in financing farm activities, appeared to maintain confidence in the long-run profitability of the sector. Despite the forecast decline in 1991 net cash income, farmers appear to have had adequate cash to meet their needs with little additional borrowing.

Total farm business debt fell almost 30 percent from its 1984 peak through the end of 1990. The rate of debt reduction slowed from 12 percent in 1986 to 3 percent in 1988, and then to less than 1 percent in 1990. The 1991 reversal of this trend is expected to be sustained through at least another year, as total debt is forecast to rise about 1 percent in 1992.

Farmers Home Administration (FmHA) direct loans continued to decline, as the agency worked through its problem loan portfolio. FmHA direct loan debt dropped more than 10 percent in 1991, and is expected to decline another 13 percent in 1992. Excluding FmHA reductions, total debt held by all other lenders increased over \$4 billion (3.5 percent) in 1991.

Small increases in asset values and only slightly rising debt are expected to increase equity to \$710-\$720 billion in 1992, a gain of about \$7 billion. These changes in equity are largely unrealized capital gains.

### **Farm Sector Returns**

Relatively high rates of return to farm equity and assets are expected to continue through 1992. The rate of return on equity from current income is expected to be 2.4 to 2.6 percent in 1992. Rates of return on equity and on assets are projected to continue the relatively favorable levels of recent years.

Other measures of financial performance also suggest a stable farm sector during 1992. The aggregate debt-to-asset ratio may rise, but only slightly. Although returns to operators are expected to fall slightly, cash income should be adequate for debt servicing.

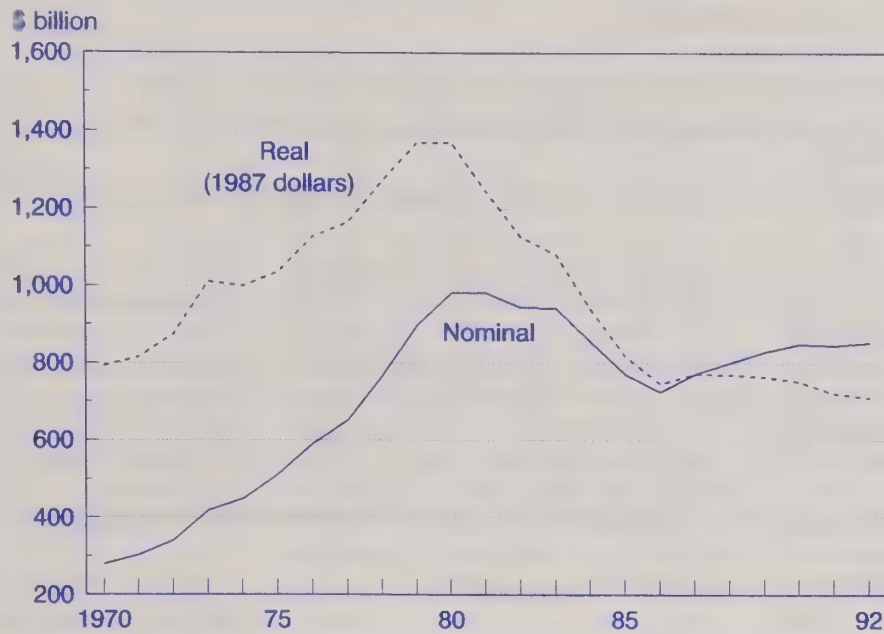
### **Foreigners Own 1 Percent of U.S. Farmland**

Foreign interests owned 14.8 million agricultural acres (slightly over 1 percent of all privately owned U.S. farmland) as of Dec. 31, 1991. These holdings have remained small and relatively steady for the past 10 years.

- Forest land accounts for 49 percent; cropland, 17 percent; pasture and other agricultural land, 31 percent; and nonagricultural land, 3 percent.
- Corporations (U.S. and foreign) own 73 percent of foreign-held acreage; partnerships, 19 percent; and individuals, 6 percent.
- Japanese investors own only 3 percent; Canadians lead with 25 percent.
- Maine has the most foreign-owned land, primarily forest land owned by Canadian companies and Canadian/U.S. and French/U.S. partnerships.

For more information, call Peter DeBraal, ERS/USDA, (202) 219-0425.

### Nominal and Real Values of Total Farm Assets



### Farm Assets, Equity, and Debt In Nominal Dollars

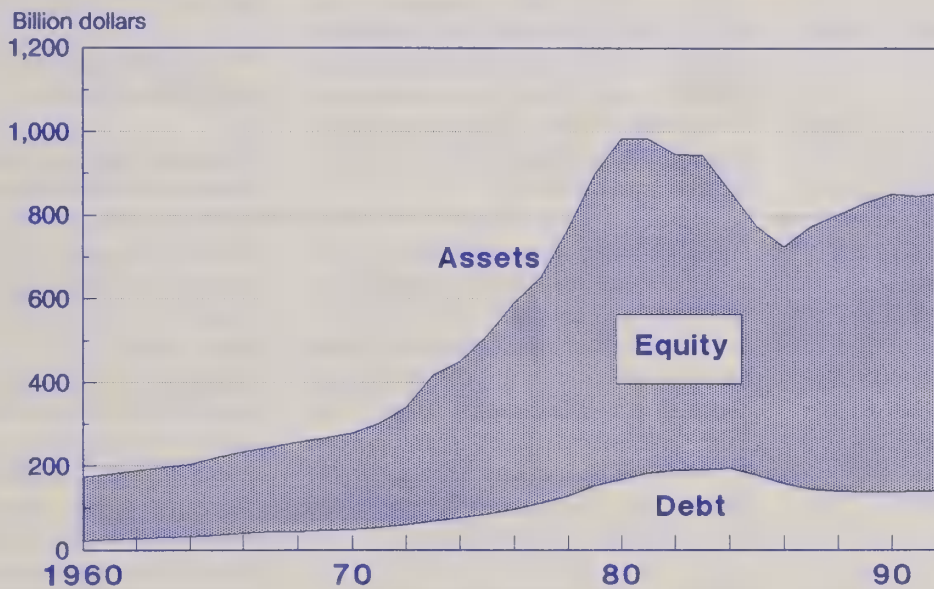


Table 3--Rates of return on farm assets and equity 1/

Year	Returns to assets			Returns to equity		
	Income	Real capital gains	Total	Income	Real capital gains	Total
	Percent					
1987-89	4.7	0.5	5.2	3.5	1.6	5.1
1990	4.6	-2.6	2.0	3.6	-2.2	1.4
1991F	4.0	-3.5	0.5	2.9	-3.7	-0.8
1992F	3 to 4	-2 to -3	1 to 2	2 to 3	-2 to -3	0 to 1

F = forecast. 1/ Excludes operator households. Totals may not add due to rounding. Returns to assets and equity are calculated using the average of the current and previous years' assets and equity, respectively.

## Credit Availability Adequate

*The debt side of the sector's balance sheet is increasing slightly after 6 consecutive years of debt reduction. This does not indicate a return to the serious stress conditions of the early 1980's.*

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Lenders generally reported adequate loanable funds to meet the 1991 borrowing needs of creditworthy customers. While stable to rising land values have restored lender confidence in the security of loans collateralized by farmland mortgages, creditors' increasing reliance on analysis of borrowers' ability to service debt from current cash flows has led to a more restrictive definition of creditworthiness. Anecdotal evidence suggests that for 1992, the drop in 1991 net cash income has meant that farmers operating on tight margins have experienced increased difficulty in obtaining operating credit. The reduction in FmHA direct lending programs means that marginal operations have fewer credit alternatives.

Lenders continue to aggressively pursue qualified borrowers, and competition for quality loans will likely intensify in 1992. Commercial bank loan balances increased over \$2.7 billion during 1991, rising for the fourth consecutive year. Commercial banks' debt grew at an annual rate of 5 percent during 1988-91, raising outstanding debt nearly \$9 billion. Bank loans are expected to increase another \$2 billion in 1992.

### **Farm Credit System Recovery Incomplete**

The Farm Credit System (FCS) reported an increase of over \$400 million in outstanding loan balances in 1991, its first annual rise since 1984. This increase was due to a \$600-million rise in nonreal estate lending, which offset a \$200-million drop in real estate debt. FCS debt is anticipated to rise slightly less than 1 percent in 1992, despite a further decline of \$200 million in real estate debt.

The FCS continues to report improved overall financial performance. As the FCS, revamped and more competitive, gains efficiency through methodical implementation of provisions of the 1987 Farm Credit Act, it could begin to recover its former farm lending preeminence. The merger of the St. Louis and St. Paul Banks, effective May 1, 1992, should reduce unit costs of providing loans in the Upper Midwest.

Farm Credit Banks, created by mergers of Federal Land Banks and Federal Intermediate Credit Banks, hypothetically integrate management of real estate and nonreal estate lending functions. Agricultural Credit Associations, formed by merging geographically compatible Federal Land Bank Associations and Production Credit Associations, have direct lending authority within their respective service areas.

These changes were to help the FCS become more responsive in satisfying borrowers' complete credit needs. However, recent rises in nonreal estate loans, coupled with the continuing declines in real estate loans, suggest that either borrowers have not come to view the FCS as a one-stop lender, or the System has not achieved the integrated loan service of commercial banks.

### **Banks Gain Market Share**

Commercial banks surpassed the Farm Credit System as the principal holder of combined total farm debt in 1987. Apparently relying on flexibility as both real estate and nonreal estate lenders, commercial banks' share of all farm lending increased from 22 percent in 1982 to 36 percent by the end of 1991. While banks have increased farm mortgage loan originations, they have also gained real estate market share by rais-

ing collateral requirements for annual operating and other nonreal estate loans. This is evident in changes in reported real estate debt, where bank loans outstanding have increased annually since 1982, rising 127 percent during 1983-91. Banks' share of total real estate debt rose from less than 8 percent in 1982 to over 23 percent in 1991.

The FCS' market share stabilized at slightly higher than 25 percent during 1988-91, after falling from 34 percent of all debt in 1982. Bank and FCS market shares are expected to increase in 1992, as their combined share approaches 63 percent of all farm lending.

### **FmHA Writeoffs—Less Than \$5 Billion To Go**

Farmers Home Administration (FmHA) loan balances fell more than \$1.7 billion in 1991, as the agency maintained a rate of debt reduction in excess of 10 percent. Early implementation of debt restructuring provisions of the Agricultural Credit Act of 1987 resulted in a nearly \$3-billion decrease in FmHA reported loan balances in 1989. FmHA debt reduction slowed to \$2 billion in 1990, and \$1.7 billion in 1991. Continuing problem debt resolution, combined with FmHA's shifting emphasis from direct to guaranteed loans, could produce a further reduction of \$2 billion in 1992.

While FmHA experienced a loan balance drop of almost \$8.4 billion during 1988-91, it still has a considerable problem loan portfolio to work through. As of March 31, 1992, loan delinquency status reports indicate that delinquent FmHA loan payments (including principal and interest) exceeded \$5.6 billion.

Table 4--Total farm debt increased \$2.5 billion in 1991, after 6 years of decline

Lender	1982	1984	1986	1987	1988	1989	1990	1991P	1992F
-----Million dollars-----					--Billion dollars--				
Real estate	101,809	106,691	90,397	82,387	77,622	75,307	73,378	75	73 to 77
Farm Credit System	43,661	46,594	35,589	30,642	28,368	26,657	25,144	25	24 to 25
Farmers Home Administration	8,298	9,522	9,712	9,429	8,951	8,126	7,544	7	6 to 7
Life insurance companies	11,829	11,889	10,374	9,352	9,016	9,038	9,599	10	10 to 11
Commercial banks	7,568	9,626	11,942	13,541	14,397	15,544	16,092	17	18 to 19
CCC storage facility	1,127	623	123	46	21	12	7	■	2 to 3
Individuals & others	29,326	28,436	22,657	19,377	16,870	15,929	14,992	15	15 to 16
Nonreal estate	86,996	87,091	66,563	62,012	61,734	61,826	63,080	64	63 to 67
Commercial banks	34,322	37,619	29,678	27,589	28,309	29,243	31,267	33	33 to 34
Farm Credit System	20,558	18,092	10,317	9,384	8,766	9,490	9,699	10	10 to 11
Farmers Home Administration	12,977	13,740	14,425	14,123	12,899	10,843	9,374	■	7 to ■
Individuals & others	19,139	17,640	12,143	10,916	11,760	12,250	12,740	13	13 to 15
Total debt (excluding CCC)	188,805	193,782	156,960	144,399	139,356	137,133	136,458	139	137 to 143
Farm Credit System	64,219	64,686	45,906	40,026	37,134	36,147	34,843	35	35 to 36
Farmers Home Administration	21,275	23,262	24,137	23,552	21,851	18,969	16,918	15	13 to 14
Commercial banks	41,890	47,245	41,620	41,130	42,706	44,788	47,359	50	51 to 53
Life insurance companies	11,829	11,889	10,374	9,352	9,016	9,038	9,599	10	10 to 11
Individuals & others	49,592	46,699	34,923	30,338	28,651	28,190	27,739	28	28 to 31

Debt outstanding as of December 31. Excludes operator household debt. ■ = Less than \$500,000.

Table 5--Changing farm debt market shares indicate that commercial banks' share is expected to continue growing

Lender	1982	1984	1986	1987	1988	1989	1990	1991P	1992F
Percent									
Real estate	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100	100
Farm Credit System	42.9	43.7	39.4	37.2	36.5	35.4	34.3	33	33
Farmers Home Administration	8.2	8.9	10.7	11.4	11.5	10.8	10.3	9	8
Life insurance companies	11.6	11.1	11.5	11.4	11.6	12.0	13.1	13	14
Commercial banks	7.4	9.0	13.2	16.4	18.5	20.6	21.9	23	24
CCC storage facility	1.1	0.6	0.1	0.1	0.0	0.0	0.0	0	0
Individuals & others	28.8	26.7	25.1	23.5	21.7	21.2	20.4	21	21
Nonreal estate	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100	100
Commercial banks	39.5	43.2	44.6	44.5	45.9	47.3	49.6	51	52
Farm Credit System	23.6	20.8	15.5	15.1	14.2	15.3	15.4	16	17
Farmers Home Administration	14.9	15.8	21.7	22.8	20.9	17.5	14.9	13	11
Individuals & others	22.0	20.3	18.2	17.6	19.0	19.8	20.2	20	20
Total debt	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100	100
Farm Credit System	34.0	33.4	29.2	27.7	26.6	26.4	25.5	25	25
Farmers Home Administration	11.3	12.0	15.4	16.3	15.7	13.8	12.4	11	9
Life insurance companies	6.3	6.1	6.6	6.5	6.5	6.6	7.0	7	7
Commercial banks	22.2	24.4	26.5	28.5	30.6	32.7	34.7	36	37
CCC storage facility	0.6	0.3	0.1	0.0	0.0	0.0	0.0	0	0
Individuals & others	25.7	23.8	22.2	21.0	20.5	20.5	20.3	20	21

Debt outstanding as of December 31. Excludes operator household debt.

Table 6--Annual changes in Farmers Home Administration debt reflect write-down, shift to guaranteed loans

Lender	1982	1984	1986	1987	1988	1989	1990	1991P	1992F
Percent									
Real estate	3.1	3.4	-9.7	-8.9	-5.8	-3.0	-2.6	1.7	1
Farm Credit System	8.3	5.1	-15.6	-13.9	-7.4	-6.0	-5.7	-0.7	-1
Farmers Home Administration	2.5	11.1	-1.1	-2.9	-5.1	-9.2	-7.2	-7.8	-13
Life insurance companies	-2.6	1.9	-8.0	-9.9	-3.6	0.3	6.2	4.1	4
Commercial banks	-0.2	15.3	11.3	13.4	6.3	8.0	3.5	7.0	6
CCC storage facility	-16.0	-29.8	-59.9	-62.8	-54.1	-44.9	-43.9	-38.5	-50
Individuals & others	0.0	-3.2	-12.1	-14.5	-12.9	-5.6	-5.9	3.1	3
Nonreal estate	4.1	-0.9	-14.1	-6.8	-0.4	0.1	2.0	2.0	1
Commercial banks	10.0	1.5	-12.0	-7.0	2.6	3.3	6.9	5.1	3
Farm Credit System	-3.3	-6.7	-26.3	-9.0	-6.6	8.3	2.2	6.1	■
Farmers Home Administration	2.1	6.9	-2.0	-2.1	-8.7	-15.9	-13.5	-12.4	-14
Individuals & others	4.0	-5.0	-19.4	-10.1	7.7	4.2	4.0	1.9	2
Total debt	3.5	1.4	-11.6	-8.0	-3.5	-1.6	-0.5	1.8	1
Farm Credit System	4.3	1.5	-18.3	-12.8	-7.2	-2.7	-3.6	1.2	1
Farmers Home Administration	2.3	8.6	-1.6	-2.4	-7.2	-13.2	-10.8	-10.3	-14
Life insurance companies	-2.6	1.9	-8.0	-9.9	-3.6	0.3	6.2	4.1	4
Commercial banks	8.0	4.0	-6.4	-1.2	3.8	4.9	5.7	5.7	4
CCC storage facility	-16.0	-29.8	-59.9	-62.8	-54.1	-44.9	-43.9	-38.5	-50
Individuals & others	1.6	-3.9	-14.8	-13.0	-5.5	-1.6	-1.6	2.6	3

## Expansion Should Gain Momentum in 1992 and 1993

*Lower interest rates and improved consumer and corporate balance sheets should aid economic recovery.*

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The economy's decline in real output ended in the first quarter of 1991. The 1.4-percent growth in real gross domestic product (GDP) from first-quarter 1991 through first-quarter 1992 was slow by historical standards. Real growth averaged 4.8 percent in the first years of the three previous expansions. Real growth will likely accelerate in the remainder of 1992 and 1993. However, the growth is likely to be slower than in recent expansions. Inflation is expected to be low for the foreseeable future, reflecting moderate growth in final demand with continued excess capacity in most industries, strong foreign competition, and a strong anti-inflation commitment by the Federal Reserve Board.

### **Real Growth Slowed in the Second Half of 1991**

After showing some signs of strength in the early part of 1991, the recovery slowed significantly in the second half. Slower growth in consumer spending generated an unplanned increase in business inventories. In response to a less favorable sales outlook, business firms reduced employment in the last 3 months of 1991. The decline in non-farm employment contributed to rising consumer uncertainty, which further helped slow the rate of increase in consumer spending, especially on durable goods.

Business investment spending relative to past recoveries has been weakened by uncertainty over the general strength of the economy and continued restructuring of balance sheets toward less overall reliance on debt. Business investment spending was also slowed in the second half of 1991 by the continuing problems in the banking sector that restrained bank loan growth. Commercial banks, in an effort to improve loan quality and profitability, have been cautious in expanding loan volume.

### **First-Quarter Economic Performance Improves Outlook**

Lower interest rates in the second half of 1991 and efforts throughout the year by consumers and businesses to reduce overall debt burdens set the stage for a stronger 1992. Data for first-quarter 1992 indicate some economic improvement has already occurred. Employment grew by over 300,000 in the first quarter after falling nearly 200,000 in the second half of 1991. Construction of single family homes increased nearly \$6 billion in real terms and consumer durable goods purchases, after falling in the fourth quarter, increased nearly \$18 billion. Real personal disposable income grew 3.0 percent in the first quarter, compared with only 0.9 percent in fourth-quarter 1991. Recent stronger real disposable income growth, rising consumer confidence, and greater overall consumer wealth point toward higher growth in consumer spending in 1992.

The recent upswing and improved outlook for consumer spending should help stimulate business spending. Business investment will also benefit from the lower costs of equity and debt capital since mid-1991. This investment should be aided by continued overall improvements in bank profitability and liquidity that should, in time, lead to more bank lending. However, growth in business investment spending may be slowed somewhat by continued efforts to control costs, improve liquidity, and reduce the overall reliance on debt in business capital structures.

### **Consumer and Business Balance Sheets Are Slowly Improving**

Although current and expected near-term income and interest rates are important determinants of consumer and business spending, spending by both groups also depends on their overall wealth and the liquidity of their assets relative to their financial liabilities.

Balance sheet conditions of the household and business sectors have improved in the last year, generally enhancing the current economic outlook.

During the 1980's, real personal consumption exceeded real disposable income, resulting in a declining savings rate. Much of the higher spending growth was financed by expanded consumer credit. As a consequence, consumer liquidity (as measured by the ratio of household financial assets to financial liabilities) declined.

As economic growth slowed in 1989, consumers began to increase their savings rate and reduce their overall dependence on installment credit. As a result consumers are now somewhat more liquid than in late 1990. However, the need to further rebuild consumer liquidity will continue. A better income outlook, greater consumer wealth, and lower interest rates indicate consumers will be somewhat less liquidity constrained in 1992 and 1993.

Corporate balance sheets are improving as well. The equity/asset ratio of nonfinancial corporations fell on a historical cost basis throughout the 1980's, reflecting the retirement of equity and its replacement with debt. This was influenced by a number of factors, including the lengthy 1980's expansion, perceived declining bankruptcy costs, the increase in corporate takeovers, and a general lack of new capital investments earning sufficiently high returns. However, the relative decline in corporate equity outstanding added significantly to the corporate liquidity problems and bankruptcy problems of the 1990-1991 recession.

The ratio of corporate equity to assets at book value has improved since its 1989 low. In 1991, the net issuance of new nonfinancial corporate equities was positive for the first year since 1983. In the last half of 1991, \$71 billion in new equity capital alone was raised. The stock market rally of 1991 and the issu-

ance of new stock, generated a 23-percent increase in the market value of non-financial corporate equity in 1991.

Business firms have also strengthened their balance sheets by replacing some of their short-term debt with long-term debt. The decline in interest rates since second-quarter 1991 helped reduce first-quarter 1992 business interest expenses by \$11.7 billion from a year earlier. The continued strengthening of corporate balance sheets will help re-

duce the overall corporate cost of capital and strengthen business investment spending. Early reports indicate corporate profits are rising sharply in first-quarter 1992, indicating greater availability of internally generated funds for investment spending.

### Implications for Agriculture

Conditions in agriculture should benefit from the overall improving economic outlook. Inflation and interest rates

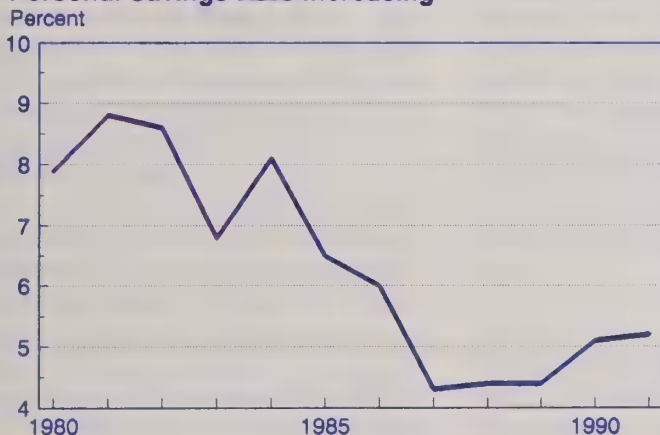
should continue to remain low by recent standards, helping to minimize increases in farm expenses. Short-term agricultural borrowing rates at commercial banks follow the general path of money market interest rates because bank interest rates on deposits follow the general path of money market interest rates. An improving general recovery should increase domestic demand for agricultural commodities.

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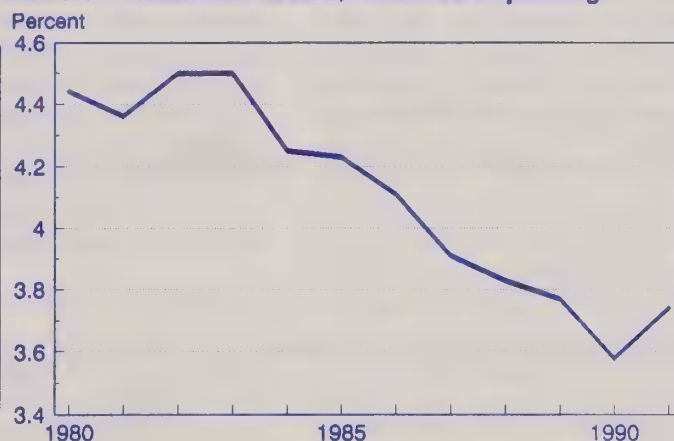
*Low interest rates and low inflation will assist in the financial improvement of farmers*

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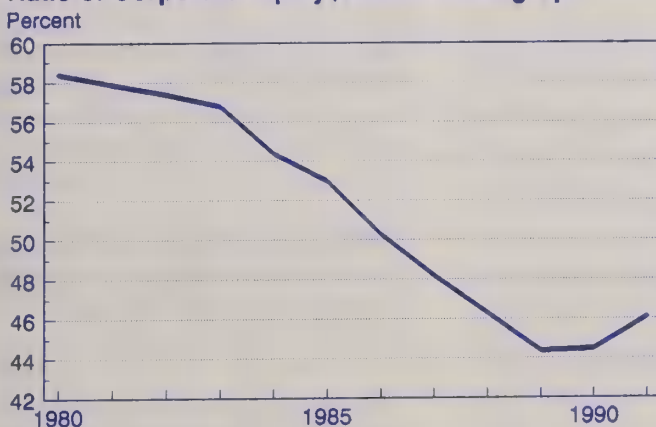
**Personal Savings Rate Increasing**



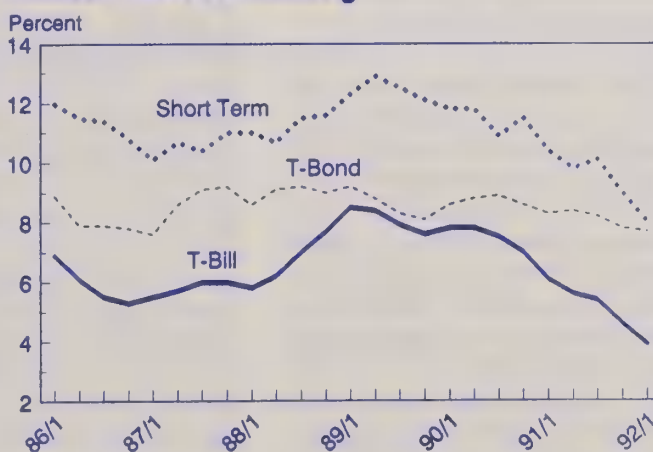
**Ratio of Household Assets/Liabilities Improving**



**Ratio of Corporate Equity /Assets Moving Up**



**Interest Rates are Declining**



# Debt Repayment Capacity of Commercial Farm Operators: How Much Debt Can Farmers Afford?

James T. Ryan and Mitchell Morehart<sup>1</sup>

**Abstract:** Preliminary estimates of commercial farm operators' use of debt repayment capacity support previous assertions that inability to meet debt repayment obligations from cash flows was a contributing factor to the farm financial crisis of the mid-1980's. Using farm sector accounts, the maximum amount of commercial farm operator debt that could be supported by annual net cash income available for principal and interest payments is presented for 1970-92. The ratio of actual debt to maximum debt repayment capacity measures the extent of debt capacity utilization. Debt capacity utilization in 1991 and 1992 appears to be relatively stable, as the effects of anticipated lower interest rates largely offset expected declines in net cash income available for debt servicing.

**Keywords:** Debt repayment capacity, debt service ratio, credit capacity, income.

Agricultural lenders evaluate borrower creditworthiness based on a combination of factors, including the loan applicant's character, repayment capacity, financial condition, and value of collateral offered as loan security. The rise in land values of the 1970's was facilitated, to an extent, by the collateral-based lending policy of some agricultural lenders. The total value of farm assets increased from \$312 billion at the beginning of 1970 to over \$1 trillion by the end of 1981, while total farm debt increased from \$51 billion to \$195 billion.

The rise in asset values and expansion of credit use, at least in retrospect, appear to have anticipated income increases that failed to materialize at projected levels. The farm financial crisis of the mid-1980's was driven, to a large extent, by the inability of borrowers to meet higher debt repayment obligations out of the cash income that their farms were generating.

As the farm sector recovery progressed during the late 1980's, lenders placed greater emphasis on borrowers' ability to cash flow loan payments out of current income. In evaluating loan applicants' repayment ability, lenders relied more heavily on debt coverage margins and debt coverage ratios. While there are several variations of debt coverage margins and ratios, all effectively measure the extent to which available income exceeds loan repayment requirements.

Credit availability does not appear to be a constraint on commercial farm operations in 1992. Agricultural lenders generally report adequate loanable funds to meet the needs of creditworthy farm borrowers. However, the downturn in net cash income in 1991, projected to continue through 1992, has reduced the cash available to farmers to meet loan principal and interest payments. Some farm operators apparently have experienced difficulty obtaining credit during 1992, as a larger proportion of potential borrowers cannot provide evidence of income adequate for debt repayment.

## Credit Capacity

Lenders apply a range of measurable creditworthiness criteria in calculating any applicant's maximum loan eligibility. Credit criteria are then weighted in determining the ultimate loan amount. An individual's credit capacity, for purposes of this article, is defined as the maximum loan amount for which that individual qualifies. Different credit criteria emerge as most restrictive in determining credit capacity for different borrowers at any point in time, while, over time, different criteria are most restrictive for all borrowers as a group.

The evaluation of a loan applicant's credit capacity varies among lenders, depending on the relative emphasis each places on the various creditworthiness criteria. Farmer Mac, the secondary market for farm real estate mortgages, determined seven underwriting standards for loans qualifying to be included in a mortgage pool (1). These standards define measures of a loan applicant's past and anticipated financial perform-

ance. Farmer Mac requires that these standards all be met simultaneously for eligible loans, with no weighting of criteria.

Applying each Farmer Mac standard to any given borrower can, in effect, provide an independent estimate of that borrower's credit capacity. It appears that these alternative measures can produce distinctly different estimates of credit capacity. While not addressing credit capacity directly, a previous analysis of Farmer Mac standards indicated that, in 1989, over 65 percent of all farm operator debt was eligible for Farmer Mac pooling under the debt/asset ratio standard (50 percent or less), while only 41 percent qualified under the debt coverage ratio standard—at least 1.25:1 (2).

The debt coverage ratio was the most restrictive of the individual Farmer Mac guidelines. When considering all underwriting standards simultaneously, however, less than 18 percent of all farm operator debt qualified. This suggests that overall credit capacity would be substantially less than that indicated by an estimate based on any one criteria.

The balance of this article presents preliminary results of research designed to estimate commercial farm operator debt repayment capacity, one measure of credit capacity. While debt repayment capacity is often a limiting factor in credit extension decisions, it must be emphasized that it is only one of several commonly used criteria. The extent of debt capital use by commercial farm operators, relative to their ability to re-

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pay, measures debt repayment capacity utilization.

The following section presents a brief discussion of financial variables relevant to computing debt repayment capacity. Then, based on USDA farm sector income and balance sheet accounts, estimates of commercial farm operator debt capacity and its use during 1970-92 are presented. Next, using data from the 1990 Farm Costs and Returns Survey, farm operators are classified by proportion of debt repayment capacity used. Differences are presented by size of farm, region, and type of farm.

### **Debt Repayment Capacity**

Debt repayment capacity can be defined as the maximum amount of debt supportable by the net cash income that is available for loan payments (see box for computations).

Income for debt coverage measures the cash income that is available, after meeting all cash expenses, to make principal and interest payments on debt, and provide a reasonable margin for capital replacement and contingencies. The debt coverage margin computes the extent to which the income for debt coverage exceeds the principal and interest payments necessary to service existing debt.

The debt coverage ratio, in essence, expresses the debt service margin in rela-

tive terms. Farmer Mac developed the precisely defined total debt service coverage ratio presented here (1). A nearly identical measure has been adopted by the Farm Financial Standards Task Force (3). According to Farmer Mac qualifying guidelines, the total debt coverage ratio should be no less than 1.25:1, including income from farm and non-farm sources. FFSTF considers a ratio above 1.1:1 as favorable.

The maximum loan payment supportable by a level of income for debt coverage can be determined by dividing the income for debt coverage by the predetermined minimum debt coverage ratio. That is, requiring a debt coverage ratio of 1.25 is equivalent to stating that no more than 80 percent ( $1 / 1.25$ ) of income for debt coverage can be allocated to payment of principal and interest.

Debt repayment capacity, measuring the amount of debt that the maximum loan payment could support, is a function of that loan payment, the interest rate, and the term of the loan. Once a maximum loan payment has been established, the maximum amount of debt that could be supported by income for debt coverage can be determined for any given amortization schedule (interest rate and loan term).

Thus, by applying a minimum debt coverage ratio requirement to any farm operator, the maximum debt that can be repaid from any level of income for debt

coverage can be computed. Operators with debt are, in effect, using a portion of their credit capacity. The ratio of actual debt to maximum debt repayment capacity measures the extent of their debt capacity use.

### **Historical Debt Repayment Capacity**

To focus on debt use by commercial farm operators, this analysis is limited to farms with sales greater than \$40,000. In 1990, these commercial-sized farm operations accounted for 627,000 of the U.S. total of 2.14 million farms. The analysis was further limited to commercial farm operators by eliminating the portion of relevant financial variables attributable to non-operator landlords.

The aggregate farm sector accounts maintained by ERS (see box) were used to construct estimates of commercial farm operator debt and preliminary estimates of key financial variables for analysis of farm operator debt repayment capacity were determined. These variables were then used to estimate debt repayment capacity and use (table A-1).

Income for debt coverage, in this analysis, measures the net cash income that is being generated by commercial farm operators, after meeting all non-interest cash production expenditures. It represents the cash income that would be available to commercial farm operators if they were debt-free and, therefore, interest expense-free. Here, it is computed by adding commercial farm operator interest expense to net cash income. This approach yields an equivalent calculation to the financial variable described above.

Commercial farms accounted for 95-97 percent of net cash income for all farm operators during 1970-1992. Nominal income for debt coverage, computed by the addition of commercial farm operators' interest expense to their share of net cash income, jumped almost 55 percent in 1973. After fluctuating during the mid-1970's, this measure rose rapidly during 1977-82, then stalled before resuming strong growth in 1987-90. The recent decline in net cash income is reflected in a 9-percent decrease in income for debt coverage in 1991, fol-

### **Measuring Debt Repayment Capacity Utilization**

*Income for Debt Coverage* = Net farm income + Depreciation + Interest on capital debt + Capital lease payments + Net off-farm income - Living expenses - Income taxes

Off-farm income, living expenses, and income taxes were excluded from the computation of income for debt coverage in the preliminary analysis presented here.

*Debt Repayment* = Principal and interest on capital debt + Capital lease payments

*Total Debt Coverage Ratio* = Income for debt coverage / Debt repayment

*Debt Coverage Margin* = Income for debt coverage - Debt repayment

*Maximum Loan Payment* = Income for debt coverage / Minimum debt coverage ratio

*Debt Repayment Capacity* = Maximum loan payment  $\times (1 - (1 + r)^{-n}) / r$

Where  $(1 - (1 + r)^{-n}) / r$  = Present value of an annuity of \$1, at  $r$  percent for  $n$  periods

*Debt Repayment Capacity Utilization* = Debt / Debt repayment capacity

Table A-1--Commercial farm operators' incomes can support higher debt levels now, but farmers and lenders are showing restraint, compared with the late 1970's.

	Income for debt coverage	Debt repayment	Total debt coverage	Debt coverage margin	Maximum annual loan payment	Commercial bank interest rates	Debt repayment capacity	Commercial farm operator debt	Debt repayment capacity use	
	--\$ million--		Ratio		-- \$ million--	Percent	--\$ million--		Percent	
1970	18,974	4,578	4.14		14,396	15,179	8.3	78,223	22,684	29.00
1971	18,813	5,150	3.65		13,663	15,051	8.2	77,825	25,985	33.39
1972	24,001	6,196	3.87		17,805	19,201	8.0	99,965	31,561	31.57
1973	36,986	8,537	4.33		28,449	29,589	8.2	153,002	43,660	28.54
1974	36,607	10,085	3.63		26,523	29,286	8.7	148,890	50,139	33.68
1975	32,103	11,390	2.82		20,712	25,682	9.0	129,257	56,727	43.89
1976	33,158	13,239	2.50		19,918	26,526	9.1	133,058	65,791	49.45
1977	31,977	15,292	2.09		16,684	25,581	9.2	127,891	75,725	59.21
1978	37,418	18,737	2.00		18,681	29,934	9.3	149,153	92,007	61.69
1979	41,354	23,279	1.78		18,075	33,083	10.8	156,908	111,728	71.21
1980	45,727	27,317	1.67		18,410	36,581	15.2	151,285	125,697	83.09
1981	48,864	31,962	1.53		16,902	39,091	18.5	146,905	140,062	95.34
1982	53,506	34,366	1.56		19,140	42,805	16.7	169,365	146,861	86.71
1983	53,446	34,142	1.57		19,304	42,757	13.5	186,190	147,419	79.18
1984	53,563	34,719	1.54		18,844	42,850	14.1	183,195	150,551	82.18
1985	59,341	31,109	1.91		28,233	47,473	12.8	211,268	135,737	64.25
1986	57,883	27,416	2.11		30,467	46,306	11.5	214,725	118,370	55.13
1987	64,558	24,983	2.58		39,575	51,646	10.6	246,546	107,572	43.63
1988	65,653	24,248	2.71		41,404	52,522	11.2	245,904	104,571	42.53
1989	67,638	24,221	2.79		43,417	54,111	12.5	243,082	104,188	42.86
1990	70,607	24,021	2.94		46,587	56,486	11.5	261,927	104,685	39.97
1991P	64,189	24,017	2.67		40,172	51,351	9.8	251,653	104,585	41.56
1992F	61,395	24,128	2.54		37,267	49,116	8.0	255,718	105,692	41.33

F = forecast, P = preliminary

lowed by a projected 4-percent drop for 1992.

As commercial farm income rose during 1977-82, however, a rapidly increasing debt level meant that the share of that income that farm operators were required to pay out in principal and interest payments rose more than proportionally. The added burden of the rising debt load is evidenced in the drop in the total debt coverage ratio from over 2.5:1 in 1976 to about 1.5:1 in 1981.

As a whole, commercial farm operators appear to have maintained an adequate margin to meet this added debt service expenditure, as the debt service margin fluctuated in a relatively stable range between \$16.5 and \$20 billion during 1976-84. This margin did not accrue equally to all commercial farm operators. Farmers who had expanded rapidly with debt financing found that principal and interest payments were consuming a substantial portion of the income they produced.

The maximum annual loan payment represents the total amount of income for debt coverage that could be allocated to debt service, while maintaining a total debt coverage ratio of no less than 1.25:1.

Debt repayment capacity, the debt that could be carried with this maximum annual loan payment, varies directly with the loan term and inversely with the loan interest rate. This measure is presented here in its simplest form, computed assuming that the total debt to be supported is financed by a 7-year loan issued at current bank interest rates. Debt repayment capacity is recomputed annually, reflecting changes in income for debt coverage and the interest rate. The relatively short repayment term, which was constant throughout the period, was selected to produce a conservative estimate of credit capacity.

Comparison of actual commercial farm operator debt with this hypothetical maximum based on debt repayment capacity indicates the extent to which commercial farm operators have used their available credit. Based on debt repayment capacity, the late 1980's would appear to have been a period of relative prosperity. Results of this analysis indicate that commercial farm operators could have supported almost \$247 billion in debt in 1987, up from less than \$147 billion in 1981. Instead of rising \$100 billion, actual debt, though increasing during the interim, dropped by over \$32 billion during this period.

The percent of debt repayment capacity used rose from less than 50 percent in 1976 to over 95 percent in 1981. This ratio then declined between 1981 and 1984, as higher income levels and more favorable interest rates supported a potential \$36 billion in additional debt, but actual debt outstanding increased only \$10 billion. The utilization ratio declined from over 80 percent in 1984 to less than 40 percent by 1990. Estimates for debt capacity use in 1991 and 1992 appear to be relatively stable, as the effects of anticipated lower interest rates largely offset expected declines in net cash income available for debt servicing.

Separate analysis of the impact of lender loan write-offs on actual debt levels, as measured here, is not included in this preliminary report. Previous estimates suggest that as much as \$20 billion in farm debt was charged off between 1984 and 1990 (4). Debt repayment capacity utilization would have declined much less precipitously if farm operators had retained liability for that debt. For example, an additional \$20 billion in actual debt would have raised 1990 debt repayment capacity utilization from under 40 percent to almost 48 percent.

## Debt Repayment Capacity Utilization Varies by Size of Farm

While commercial farm operators' use of debt repayment capacity has varied over time, it has also varied considerably for different sizes of farms. Intuitively, the greater the proportion of total debt repayment capacity that is being used at any time, the greater the borrower's vulnerability to temporary adversity.

Analyzing the use of debt repayment capacity by size of farm indicates that, although commercial farms as a whole generally appeared to have generated sufficient income to service debt, many operators of smaller farms may have carried debt in excess of their repayment ability. Use of debt repayment capacity by various sizes of farms was determined by further classification of commercial farm operations by value of sales class for 1978-90 (table A-2). Farms in the largest sales classes (sales over \$250,000) maintained debt levels within their ability to repay throughout the period.

The smallest commercial farm sales class (sales of \$40,000-\$99,999) appears to have been borrowing in excess of repayment ability continuously from 1980 through 1984. This excess use of credit peaked in 1981, when farms in this sales class carried almost 36 percent more debt than their income for debt repayment would have supported. Farms with sales between \$100,000 and \$250,000 averaged using over 90 percent of their capacity during 1980-84.

While the commercial farm portion of the farm sector appears to have not borrowed in excess of its debt repayment capacity during most of 1970-90, these results support the view that smaller farm units were not able to generate sufficient cash to cover debt repayment obligations for much of the early 1980's. This finding is consistent with the popular view that family farm operations bore the brunt of the farm financial crisis of the 1980's. Those trying to gain production efficiencies through credit-financed expansion during the late 1970's were most severely affected.

These results also suggest the limitations of interpreting traditional meas-

Table A-2--Smaller commercial farm operators' use of debt exceeded their ability to repay during the early 1980's.

	Value of sales				Total
	\$500,000 and over	\$250,000 to \$499,999	\$100,000 to \$249,999	\$40,000 to \$99,999	
■ billion					
Commercial farm operator debt					
1978	19,072	20,392	23,051	29,492	92,007
1979	24,792	25,842	28,927	32,167	111,728
1980	30,103	30,059	32,563	32,972	125,697
1981	34,434	34,964	36,712	33,952	140,062
1982	39,224	24,633	48,281	34,722	146,861
1983	31,811	26,505	53,001	36,102	147,419
1984	41,054	29,563	47,143	32,791	150,551
1985	31,710	29,649	44,468	29,912	135,737
1986	28,636	26,232	38,979	24,522	118,370
1987	24,571	22,246	36,675	24,079	107,572
1988	25,297	21,654	35,444	22,177	104,571
1989	28,347	22,895	31,741	21,205	104,188
1990	30,685	21,443	32,356	20,201	104,685
Debt repayment capacity					
1978	46,410	29,939	33,240	39,563	149,153
1979	50,954	34,866	35,746	35,343	156,908
1980	49,362	35,205	35,329	31,390	151,285
1981	51,249	37,032	33,631	24,993	146,905
1982	59,276	29,524	49,661	30,903	169,365
1983	54,452	36,051	60,963	34,724	186,190
1984	66,048	37,294	51,531	28,322	183,195
1985	64,743	45,352	63,454	37,718	211,268
1986	73,582	41,543	63,008	36,592	214,725
1987	90,004	42,526	72,195	41,821	246,546
1988	93,189	40,464	71,121	41,130	245,904
1989	102,071	41,886	61,362	37,762	243,082
1990	113,728	44,194	67,277	36,728	261,927
Percent					
Debt repayment capacity utilization					
1978	41.09	68.11	69.35	74.54	61.69
1979	48.66	74.12	80.92	91.02	71.21
1980	60.99	85.38	92.17	105.04	83.09
1981	67.19	94.42	109.16	135.84	95.34
1982	66.17	83.44	97.22	112.36	86.71
1983	58.42	73.52	86.94	103.97	79.18
1984	62.16	79.27	91.48	115.78	82.18
1985	48.98	65.37	70.08	79.30	64.25
1986	38.92	63.14	61.86	67.01	55.13
1987	27.30	52.31	50.80	57.58	43.63
1988	27.15	53.51	49.84	53.92	42.53
1989	27.77	54.66	51.73	56.15	42.86
1990	26.98	48.52	48.09	55.00	39.97

ures in analyzing farm financial conditions individually. The debt/asset ratio is a commonly used indicator of farm solvency and overall financial health. During the early 1980's, when small commercial farm operations were in debt substantially beyond their ability to repay, the average debt/asset ratio for these farms did not exceed 25 percent (table A-3). These results may be biased downward, however, due to the omission of off-farm income and family living expenses from this preliminary analysis. Families on smaller farm operations typically have higher off-farm incomes, and lower family living expenses, than those on larger units.

Considering earnings solely from farm operations, smaller farms were only generating sufficient income to repay a level of debt that would have been less than 20 percent of the value of their assets. At the same time, farms in the largest sales classes apparently were able to generate more than adequate income to meet principal and interest payment or to support debt/asset ratios greater than 35 percent.

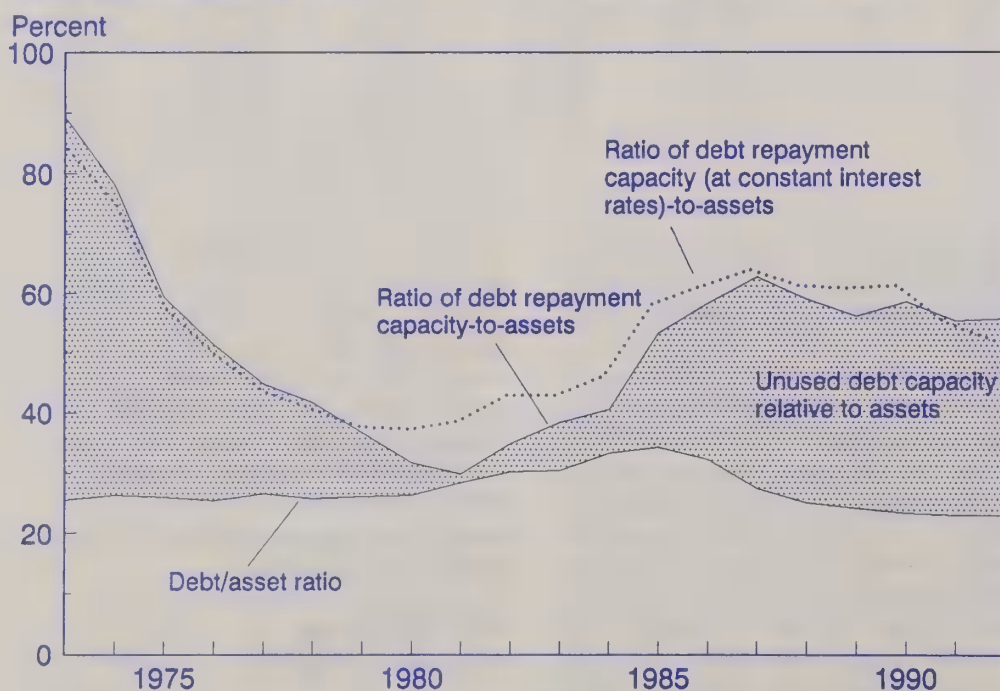
## Debt Repayment Capacity Sensitivity

The results presented here are not insensitive to the interest rate used in determining debt repayment capacity. For

Table A-3--Despite apparently less favorable debt/asset ratios, larger commercial farms have adequate income to support higher debt levels.

	Value of sales				Total
	\$500,000 and over	\$250,000 to \$499,999	\$100,000 to \$249,999	\$40,000 to \$99,999	
Actual debt/asset ratio	Percent				
1978	35.5	28.5	24.4	21.3	25.7
1979	35.0	28.7	25.4	21.1	26.1
1980	34.5	28.8	25.6	20.8	26.3
1981	36.7	31.1	27.7	22.1	28.4
1982	38.8	33.3	29.7	23.4	30.2
1983	39.2	34.0	30.3	24.0	30.4
1984	42.8	36.4	32.7	25.0	33.3
1985	43.2	39.6	34.5	25.1	34.3
1986	37.5	40.0	32.9	22.8	32.2
1987	31.8	33.3	28.9	19.8	27.4
1988	29.1	29.5	26.6	18.1	25.1
1989	27.7	28.1	25.3	17.2	24.1
1990	26.8	27.1	24.5	16.6	23.4
Maximum feasible debt/asset ratio					
1978	86.5	41.9	35.2	28.6	41.7
1979	72.0	38.7	31.4	23.2	36.7
1980	56.6	33.7	27.8	19.8	31.7
1981	54.6	32.9	25.4	16.3	29.8
1982	58.6	40.0	30.5	20.8	34.8
1983	67.1	46.3	34.9	23.1	38.4
1984	68.9	45.9	35.8	21.6	40.5
1985	88.3	60.6	49.3	31.6	53.3
1986	96.4	63.3	53.2	34.0	58.3
1987	116.6	63.7	56.9	34.3	62.8
1988	107.1	55.2	53.4	33.5	59.1
1989	99.7	51.4	49.0	30.6	56.2
1990	99.2	55.9	50.9	30.2	58.5

Figure A-1  
Commercial Farm Operators Nearly Reached the Maximum Feasible Debt/Asset Ratio in 1981



example, a \$1,000 loan payment would service a 7-year loan of \$5,206 at the prevailing 1992 interest rate of 8 percent, while the same \$1,000 would service a loan of only \$3,758 at the 1981 rate of 18.5 percent. Roughly stated, the same income level will support 40 percent more debt at 8-percent interest than at 18.5 percent.

To estimate the interest rate sensitivity of debt repayment capacity, the analysis was also conducted assuming a constant interest rate throughout 1970-92 (figure A-1). The difference between the maximum feasible debt/asset ratio and the actual debt/asset ratio indicates the relative level of unused debt repayment capacity available at any time. While reducing the interest rate impact does affect the magnitude of this difference, it does not alter the conclusion that the financial stress of the mid-1980's followed from the reduced debt repayment capacity farm operators began to experience early in the decade.

Comparison of the growth in debt with the change in debt repayment capacity during the late 1970's and early 1980's supports the perception that farm operator debt grew at a rate that was not sustainable by a concurrent growth in debt repayment capacity (figure A-2). Considering a starting point of 1970, repayment capacity exhibited cumulative growth greater than the rise in debt through 1976. From 1977 to 1984, however, the cumulative change in debt exceeded that supportable by the earnings growth of that period.

Measuring cumulative debt repayment capacity based on a constant 10-percent interest rate, rather than current bank rates, suggests that during 1976-1981, farm operators' use of debt grew at a rate consistent with a perceived long term interest rate of 10 percent.

### Financial Stress Foreshadowed By Rising Debt

Debt repayment capacity utilization would appear to be a leading economic indicator of farm financial stress. The years 1985-87 are generally considered to be the period of greatest farm financial stress, as measured by falling land values, rising farm foreclosures, and lender loan losses (4). Analysis of debt repayment capacity supports the view

Figure A-2  
**Commercial Farm Operators Accumulated Debt At A Faster Rate Than Debt Repayment Capacity Grew During the 1979-84 Period**

Million dollars  
 200,000

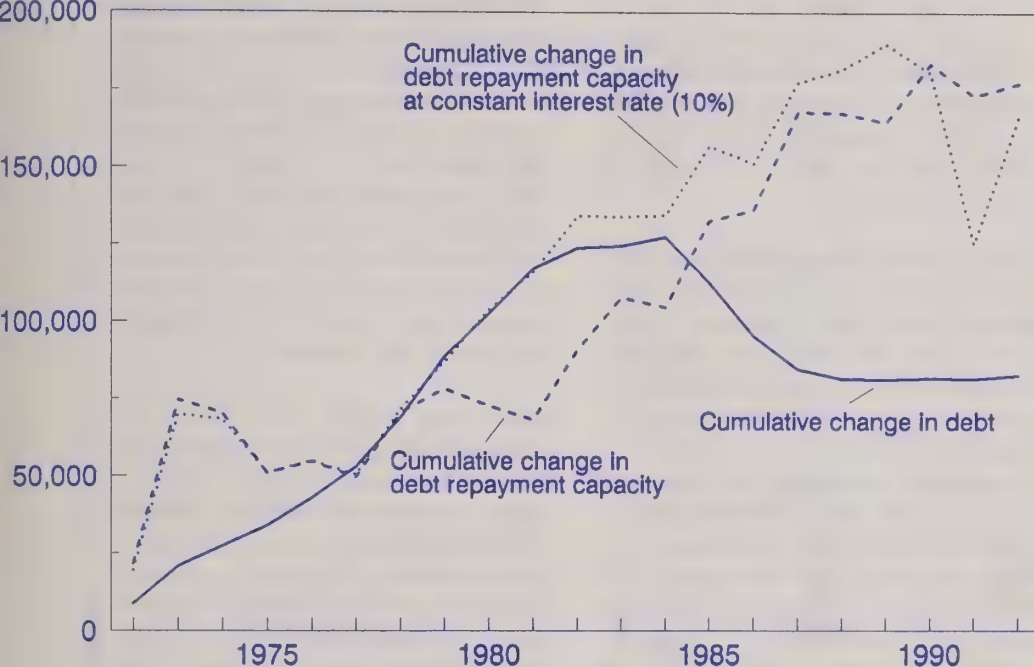
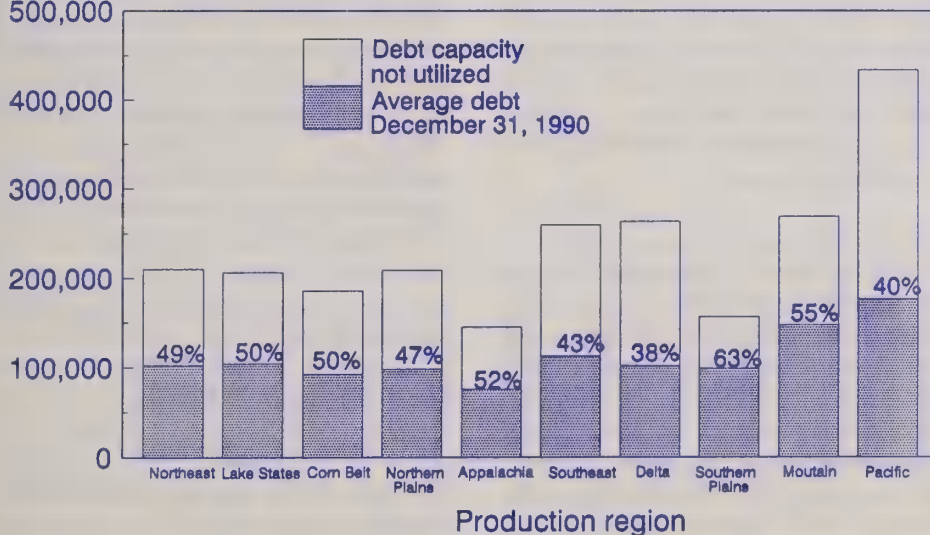


Figure A-3  
**At The End Of 1990, Commercial Farm Operators in the Pacific Region Had the Highest Average Debt Repayment Capacity and One of the Lowest Utilization Rates**

Dollars per farm  
 500,000



that it was the increased reliance on debt financing during the 1970's—rather than reduced farm operator incomes during 1985-87—that principally contributed to the farm financial crisis of the mid-1980's.

Total farm operator debt increased 156 percent during 1974-79, while debt repayment capacity at the end of 1979 was only 2.5 percent higher than it had been at the beginning of 1974. These

changes resulted in a rise in use of debt repayment capacity from less than 30 percent to over 70 percent during 1974-79. As debt continued to mount, debt repayment capacity use increased to 95 percent in 1981. Despite a 35-percent rise in operator debt during 1979-84, concurrent increases in earnings, coupled with lower interest rates, resulted in lower use of repayment capacity after 1981.

Comparison of cumulative debt and repayment capacity growth since 1970, however, suggests that the increased debt of the late 1970's created an 'excess debt' condition (figure A-2). This situation prevailed until 1985, when cumulative debt repayment capacity growth surpassed cumulative debt expansion. This supports the view that the farm financial crisis of the mid-1980's was due, at least in part, to the working out of the 'correction' to the 'excess debt' condition that developed during the late 1970's.

### **Most Commercial Farms Underutilized Debt Repayment Capacity in 1990**

The debt repayment capacity model was applied to the 1990 Farm Costs and Returns Survey (FCRS) data to provide a current perspective about the extent to which different farm businesses were using their estimated credit capacity.

Almost 40 percent of commercial farms surveyed reported debt, at the end of 1990, that was less than 20 percent of their estimated credit capacity (table A-4). Farm operators in this group had average farm business assets of \$626,000 and only \$13,500 of debt. Given their ability to generate returns above 6 percent, the results suggest that they could support debt that represented 50 percent of assets.

In contrast, 27 percent of commercial operations had debt that exceeded their estimated credit capacity. These farms may have dramatically different loan terms than assumed in the model, could have experienced unfavorable production circumstances, or relied on off-farm sources of income to service existing debt. These farms, on average, experienced a cash deficit of over \$1,000 before interest expenses of \$19,500 on \$190,700 of debt.

The rate of debt use was directly related to the size of the farm business. The largest farms, those with gross sales of \$500,000 or more, had debt at the end of 1990 that represented only 38 percent of estimated capacity, compared with a credit capacity use rate of 70 percent for farms with gross sales between \$40,000 and \$99,999. Fewer of the largest operations exceeded their estimated debt capacity when compared with the small-

## Data Sources

Data for the historical portion of this analysis were drawn primarily from the farm sector accounts. Applying a benchmark and mover system to the sector accounts, relevant variables were constructed for 1970-1992 (table A-1). Data from the 1990 Farm Costs and Returns Survey were used to determine the distribution of commercial farms by the extent they used debt repayment capacity (table A-4).

### **USDA Farm Sector Accounts**

The Economic Research Service annually publishes income statement and balance sheet account data for the farm sector (5). The sector estimates in these accounts include financial data for all farms (defined as those establishments that sell or normally would sell at least \$1,000 of agricultural products in a calendar year). Generally, the sector estimates also include financial data for nonoperator landlords as well as for farm operations. However, in the USDA farm sector accounts, net cash income measures income to farm operations only, as net rent to nonoperator landlords is deducted as an expense in determining net cash income.

The analysis presented here is limited to commercial farm operations, who are defined as those with sales greater than \$40,000. For the variables for which sales class estimates are available in the sector accounts, the sector estimates generally include data for nonoperator landlords. Limitation of the analysis to commercial farm operators required a twofold disaggregation of the sector data: 1) measures of sector income, expenses, assets, and debt were distributed between commercial (sales greater than \$40,000) and noncommercial farms; and 2) for these commercial farms, income expenses, assets, and debt were distributed between farm operators and nonoperator landlords.

Distributions, by sales class, of certain key financial variables are published annually by USDA. Sales class data

on number of farms and net cash income are readily available (USDA). Distribution of commercial farm operator interest paid was derived from unpublished accounts maintained by ERS, based on the 1987 Census of Agriculture, AELOS.

Annual principal payments were estimated for farm sector real estate and nonreal estate debt. Estimated principal repayment on real estate debt was based on the assumption that the average loan was in the seventh year of a schedule amortized over 20 years at the current average rate on outstanding real estate debt. Estimated principal on nonreal estate debt was similarly computed, with the average loan assumed to be in the third year of a schedule amortized over 7 years at the current average nonreal estate interest rate.

Estimates of real estate and nonreal estate principal payments were summed for the sector, and the total principal payment attributable to commercial farm operators was assumed to be proportional to commercial farm operators' share of total debt. Annual debt repayment was estimated as the sum of principal and interest paid by commercial farms.

Sales class distributions of operator debt and assets are estimated using a benchmark and mover system, with the Census Farm Finance Surveys of 1970, 1979, and 1988 serving as distribution benchmarks (6,7,8). For the benchmark years, total sector asset and debt levels, as reported in the sector accounts, were distributed to sales classes in the same proportion as the survey data.

For each of the benchmark years, asset and debt data were converted to values per farm within each sales class. During the intervening years, per farm values were changed annually based on the annual change in the sector total, adjusted for the total period change in each sales class relative to the total period change for the sector.

Annual changes for 1989-92 were assumed to follow the relative within-class changes of 1979 to 1988 benchmarks. Data were adjusted to reflect peak asset values in 1981 and peak debt levels in 1983. Total asset and debt levels within each sales class during 1970-92 were then computed as the product of the per farm value and the number of farms. Asset and debt amounts were then redistributed to obtain consistency with sector totals.

Assets and debts within each sales class were then allocated between operators and nonoperator landlords, based on the distributions reported within each sales class in the benchmark surveys. The total change in operator and nonoperator landlord shares between benchmark years was then distributed in equal annual adjustments to the intervening years.

For this analysis, debt repayment capacity was calculated for loan amortization schedules based on three alternative interest rates (current bank rates (9), average interest rates on outstanding debt, and a constant 10-percent rate for 1970-92 over three alternative hypothetical repayment terms (5, 7, and 10 years). For simplicity, and to produce a conservative estimate of debt repayment capacity, only the results for loan payments amortized over 7 years at current commercial bank interest rates are presented here (table A-1).

### **Farm Costs and Returns Survey**

The Farm Costs and Returns Survey (FCRS) is a personally enumerated annual survey of over 26,000 farms and ranches. The FCRS obtains production expenses, capital purchases, financial information, detailed production practice data, and other farm operating characteristics. Nonoperator farmers, landlords, and contractors are not included in the survey.

Table A-4--Use of debt repayment capacity varied widely among commercial farms in 1990

	Excess borrowing	Percent of debt repayment capacity used by commercial farms				
		80-100%	60-80%	40-60%	20-40%	20% or less
Percent						
All farms	26.88	5.61	7.04	9.33	12.04	39.09
Economic class:						
\$500,000 or more	21.24	6.69	5.28	8.56	14.55	43.69
\$250,000-\$499,999	23.46	4.96	7.52	10.56	15.09	38.40
\$100,000-\$249,999	24.53	6.62	7.48	11.67	13.92	35.79
\$40,000-\$99,999	30.76	4.80	4.82	7.17	9.17	41.28
Production region:						
Northeast	24.17	6.59	12.02	9.69	10.19	37.34
Lake States	27.87	6.96	7.14	11.26	14.09	32.67
Corn Belt	23.89	7.26	7.73	11.01	11.38	38.73
Northern Plains	24.57	5.82	7.65	7.78	13.67	40.51
Appalachia	25.01	d	d	7.88	11.59	48.08
Southeast	34.00	2.78	3.02	7.71	8.28	44.22
Delta	31.25	6.74	5.90	7.83	9.75	38.53
Southern Plains	32.69	3.71	5.01	7.43	11.20	39.97
Mountain	34.00	4.41	4.94	5.24	13.76	37.65
Pacific	25.53	3.87	5.72	11.16	10.95	42.77
Production specialty:						
Cash grain	24.99	6.44	7.22	9.50	13.23	38.62
Tobacco	13.61	d	d	6.96	18.13	54.46
Cotton	21.31	d	d	12.29	9.46	47.93
Other field crops	39.20	4.80	d	d	15.59	31.33
Vegetable, fruit, nut	28.25	d	d	7.39	11.20	45.63
Nursery, greenhouse	20.03	d	d	d	8.96	58.98
Beef, hog, sheep	29.79	4.62	5.93	7.90	10.34	41.42
Poultry	29.66	5.26	20.47	10.33	6.33	27.95
Dairy	22.85	7.61	8.84	12.97	13.51	34.22
Other livestock	53.01	d	d	d	d	22.38

d = Data insufficient for disclosure.

Source: 1990 Farm Costs and Returns Survey, USDA.

est operations. More than 1 in 5 farm businesses with gross sales of \$500,000 or more had debt that exceeded their repayment capacity. These farms had a cash shortfall of over \$75,000 before interest expense, which averaged \$95,000 on over \$770,000 of debt. Despite their inability to service existing debt out of current income, these farms had average assets of over \$2.5 million at the end of 1990.

Use of estimated credit capacity varied regionally from a low of 38 percent in the Delta to a high of 63 percent in the Southern Plains region (figure A-3). At the end of 1990, commercial farms in the Pacific region had the highest average debt at \$176,000 and estimated credit capacity at over \$434,000. On average, farms in this region had gross sales that were more than double those in most other regions. Similarly, the smallest sized farms, on average, were located in Appalachia, where average debt and estimated credit capacity were lowest.

Tobacco, cotton, and nursery/greenhouse production specialties had the lowest rates of debt capacity use when

compared with other types of farms. Only 14 percent of tobacco farms were found to have debt in excess of estimated credit capacity, while nearly 60 percent of nursery/greenhouse operations used less than one-fifth their estimated debt repayment capacity.

### Conclusions

Comparison of actual commercial farm operator debt with maximum debt repayment capacity yields a measure of debt repayment capacity utilization. Preliminary results support previous assertions that the farm financial crisis of the mid-1980's was largely derived from increases in debt financing in the late 1970's and early 1980's that were not supportable by farmers' ability to repay. Estimated maximum debt supportable by 1992 income appears to be relatively stable, as the effects of anticipated lower interest rates largely offset expected declines in net cash income available for debt servicing. Results of this preliminary analysis suggest that debt repayment capacity utilization may warrant monitoring as a leading economic indicator of farm financial stress.

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# Calculating State-Level Estimates of USDA's Farm Income Accounts

by

Roger Strickland and Chris McGath<sup>1</sup>

**Abstract:** USDA publishes farm income estimates at the national and State levels. For State-level expenses, estimates are primarily derived by indirectly distributing the national estimate to the States based on relationships from the Census of Agriculture and other sources. Many judgmental decisions underlie the distributors so the resulting State-level net farm income estimates must be used and interpreted carefully.

**Keywords:** State net farm income, State farm expenses

The Economic Research Service (ERS) estimates and publishes gross and net agricultural income estimates for each State and at the national level. The series measure the financial status of the agricultural sector, commodity groupings, production regions, and farm operations. These indicators identify trends over time and help analyze problems and solutions to financial and structural situations.

Frequent users of the income series include the U.S. Department of Agriculture, the Office of Management and Budget, the General Accounting Office, and Congressional Agricultural Committees.

The Department of Commerce incorporates the ERS series in the National Income and Product Accounts (NIPA) as the measure of the agricultural sector's contribution to the gross domestic product (GDP) and other NIPA aggregations.<sup>2</sup> The net farm income series is designed primarily for compatibility with GDP. It measures the net value of the sector's contribution to the national economy in the form of its production of goods and services less related expenditures.

The national and State income series must value and account for all produc-

tion-related financial activities within the sector. This is in contrast to ERS' other measures of earnings at the firm and enterprise level, which may exclude some aspects of the sector.

Because the sector-wide income measures are essentially derived as residuals from gross income less total expenses, an estimate of income and expenses from each component source must be included. However, not all the required data can be deemed statistically reliable. Whenever reliable data are not available, analysts must devise procedures for estimating the data, drawing upon whatever resources and expertise can be found. While the "best available" data are used for each component of income and expenditures, the quality varies. Fortunately, data quality tends to be correlated with the importance of the commodity or component account, measured both by its proportion of the total or its contribution to the volatility in the accounts.

## *The Neglected Database*

Gathering quality production and financial statistics is expensive, and various data needs compete for scarce funding. Statistics on corn, wheat, and cattle production are abundantly available and reliable, while little information is available regarding numerous minor commodities, farm buildings, and farm residences, although the total may be more important to the sector's financial indicators than any single commodity.

The 1970's was a period of well-being for U.S. farmers and ranchers. However, during this period support for collecting agricultural data steadily eroded.

This was particularly true of financial statistics, which farmers considered to be confidential.

For example, the 1982 Census of Agriculture did not have questions pertaining to important financial data, and legislation explicitly prohibited the follow-on survey to the Census that would normally collect the financial data. The Census of Agriculture had collected financial data every 5 years since 1959. In 1982, USDA discontinued collecting data for numerous vegetables and the amount of feed crops used on farms where produced. Data for farm labor and grain stocks were collected less frequently.

The database for USDA's income measures deteriorated to the point that the series was deficient as an indicator of financial stress in the farm sector and for meaningful analysis to differentiate the problems among regions of the country, size of operations, and commodities.

## *Improvements to the Database*

By the late 1970's, ERS had become quite concerned about the inadequacies in the database. The issues were addressed in a 1977 report by the Office of Federal Statistical Policy and Standards of the Department of Commerce (6); and in ERS-sponsored studies in 1978 (7,8,9) and 1980 (4,5). Production expenses particularly needed improvement, even at the U.S. level, due to the inadequacy of census and survey data.

Annual adjustments were made to the census expense estimates based on physical data, price indices, and historical relationships which reflected the

<sup>1</sup> Agricultural economists, Economic Research Service, USDA.

<sup>2</sup> The National Income and Product Accounts determine the value and composition of the Nation's production of goods and services and the distribution of income generated in its production. Gross Domestic Product, a measure of the total output produced by labor and property within the U.S., is one of several related and complementary aggregations within NIPA. (1,2,3).

level, and magnitude, and direction of change. Annual changes for expense items not collected by the census were developed in much the same way.

As better data became available in the 1980's, it became apparent that these methods underestimated individual expenses because of omissions of specific items within accounts.

In the early 1980's, ERS and the National Agricultural Statistical Service (NASS) renewed emphasis on improving the agricultural database and income estimation procedures. Data collection efforts and resources were increased.

One of the more significant efficiency moves was integrating two existing surveys (Farm Production Expenditures and Cost of Production) into one, the Farm Costs and Returns Survey (FCRS). The design and sample size of the FCRS facilitated vast improvements in the conceptual and statistical base of data collected for farm enterprises and various classifications of whole-farm operations (e.g., size and type). The geographic scope is still limited because statistical significance has been achieved only at the national level.

The scope and efficiency of the FCRS were continually upgraded throughout the decade, strengthening the database at the national level and allowing analysts to address more effectively the issues related to farm production expenses, farm household income, valuation of farm land and buildings, income earned under production and marketing contracts, and classification by operational attributes. An increase in the frequency with which NASS conducts a separate survey for labor data is a significant contribution in filling a hole in the expense data.

Another notable example to address a specific void in the data series is the cooperative and systematic effort by ERS and NASS to collect and estimate cash receipts for minor commodities and minor producing States that are not included in NASS' national survey program. In 1991, the receipts for commodities not in the national program amounted to \$12 billion, 7 percent of the total for all commodities, and more than for either vegetables or fruits.

The lack of information about production and sale of minor commodities and of major commodities by minor producing States was the principal problem in accounting for receipts. This joint ERS/NASS effort has substantially improved these data by formalizing a process that efficiently captures and quantifies the considerable knowledge of agricultural production resident in the NASS State offices. This solution is certainly not the equivalent of scientific surveys but does represent a big gain in information at little additional cost.

### ***1987 Census of Agriculture***

The Census of Agriculture has been an unparalleled source of data about U.S. agricultural producers and their operations for decades. However, with resource limitations and multiple objectives, it has never collected all the data required for a complete accounting of farm income. The charge and focus of the Census has historically been to count people and farm animals, describe the agricultural sector by various socioeconomic classifications, and count and value the physical assets of farms. This information is useful and easy to collect. In contrast, collecting information about money and financial transactions is more difficult, because people generally consider such facts sensitive and confidential.

ERS was successful in having questions added to the 1987 Census of Agriculture to collect data on income from miscellaneous sources, particularly income that was not commodity based, and on several new categories of expenses. These latter items included repair and maintenance, property taxes, cash rent to landlords, and a "catch-all" category of residual expenses not specifically itemized on the questionnaire which are useful for a more complete accounting of all economic activities.

The omission of a follow-on financial survey to the 1982 Census of Agriculture handicapped analysts evaluating the financial crisis occurring in the U.S. agricultural sector in the early to mid-1980's. Data collected in the relative prosperity of 1979 contributed little to understanding the magnitude and causes of the problems.

The 1988 Agricultural Economics and Land Ownership Survey (AELOS), following the 1987 Census, had a somewhat different focus than the 1979 survey, but still emphasized financial data. Important data were collected on landlords and farm buildings, including assets and debt. The last time this information had been collected was in a 1979 survey following the 1978 Census. During the intervening years, farm real estate values had declined dramatically, bottomed out, and turned upward.

The Census of Agriculture is the exclusive source of data about landlords and distributions of agricultural attributes as reflected in its statistics among States. However, the FCRS is a valuable source of national data related to operators, thus providing a check on the accuracy of the Census and an alternative to omissions. Obviously, a census is preferable to a sample survey, but increasing concerns about deficiencies in design and implementation of the Agricultural Census increase the value of the FCRS in developing the income database.

With the release of the 1987 Census in 1989 and the 1988 AELOS in 1990, production expense components of the income accounts for the intercensal years, 1983-1986, were evaluated to determine if revisions were warranted. Some accounts were adjusted by benchmarking to the 1987 Census. Appropriate components of production expenses from the 1987 Census of Agriculture were incorporated into the accounts for farm income. For 1988 through 1990, the benchmarks were updated and the affected accounts re-estimated to reflect the new information available regarding 1987 and 1988. Data prior to 1982 were not adjusted.

ERS was concerned about the validity of the 1987 Census for several reasons. The numerous ownership and risk-sharing arrangements prevalent in agricultural production in the 1980's had become more important for defining a farm. Also of concern was whether the Census questionnaire adequately captured changes related to ownership and risk taking. Data omission or double counting was possible in the case of farmers having production contracts due to specialization of functions.

ERS also was unsatisfied by the use of mailed census forms from farmers which are a much less effective method of collecting complete and accurate data than the more expensive personal enumeration. Personal visits can clarify questions and avoid misinterpretations, provide assistance in formulating the most appropriate responses, and encourage reluctant respondents to comply with their best effort. Enumerators are often local residents who know the region's agriculture and mitigate the irritation often directed at the "faceless bureaucracy."

The FCRS sample is large and generally quite adequate for collecting national statistics, but it does not have a sample size sufficient to yield reliable production estimates for all States. The statistics are reliable for a few of the important farming States, but not for others.

Where reliable data do not exist, farm income statistics are derived in various ways. The conceptually preferred method is, whenever possible, to derive separate and independent estimates for every State which can be summed to obtain the national total. The independent estimation of each State's expense items ensures greater precision in reflecting differences among States, and directly reflects the varying effects of year-to-year changes in weather and markets. However, this series depends upon data collected annually for all States.

More often, however, data limitations preclude this procedure. In many cases, data for producing reliable estimates are available only at the national level, due to the fact that the data can only be collected via surveys that are too small to guarantee comparable quality for each and every State. In such situations, it is best to start with the national estimate and work down to the States because the degree of accuracy established for the national statistics provides a precise reference point from which to gauge the direction and magnitude of change in the State's estimate.

Two examples where detailed data are commonly available and sufficient to allow direct estimation by State are cash receipts from the sale of farm produced commodities and direct Government payments to farmers. Government pay-

ments represent the ideal in that they are based on administrative data. Cash receipts, which account for the large majority of gross income (87 percent in 1990) are based on State production, price, and marketing statistics from NASS. These survey data are usually not subject to major revisions beyond the second year, even following the Census of Agriculture. Monthly data are even available for market prices, marketing patterns, CCC loan activities, and direct Government payments.

With direct Government payments and cash receipts accounting for 96 percent of gross receipts, the income side of the ledger is in relatively good shape. The expense side is a different story.

### ***Direct Production Expense Data Unavailable***

For all but two individual production expense accounts (table B-1), State estimates are derived indirectly by calculating a national estimate and then distributing it to the States. The three general methods used are: 1) the national production expense estimate is allocated annually among States using the State/U.S. ratios in the most recent Census of Agriculture; 2) the national estimate is allocated annually using the Census State/U.S. ratios adjusted annually by the change in a related data series; 3) the national estimate is allocated annually based on the distribution of a data series judged to be the best available indicator of a particular expense's distribution.

Ten expense accounts use the first method (table B-2). In this case, the Census relationships are the sole source of the distributions for the intercensal years. For these accounts, the State/U.S. ratios for each intercensal year (1983-86) are interpolated between the 1982 Census and 1987 Census ratios. The 1987-90 State distributions use the 1987 Census ratios. These ratios will be used for future years until the release of the 1992 Census. At that point, the post-1987 years will be revised.

Four expense accounts use the second method (table B-3), in which the census State distribution is adjusted by multiplying the Census State/U.S. ratios by the change in the mover (a related) se-

ries State/U.S. ratios between the census year and the year being distributed. For instance, livestock feed purchased uses State estimates of the value of livestock production as an indicator of relative movements in feed consumption and purchases among States. For 1988-90, the final State/U.S. ratios for livestock feed purchased were calculated by adjusting the 1987 Census State/U.S. ratios of feed purchased on livestock SIC farms by the change in the State/U.S. ratios of the value of livestock production between 1987 and the year being distributed.

For eight expenses (table B-4), no direct census data are available. These expenses must be distributed to the States based on a related cross-sectional indicator in the year being distributed. In some cases, the expense is first allocated to production regions using FCRS relationships and then distributed within the region by another indicator. Marketing, storage, and transportation expenses are a good example of this procedure. After they are allocated to production regions using the FCRS distribution, they are distributed within the region by the State/region ratios of total cash receipts.

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Table B-1--Expenses for which State estimates are calculated directly (national estimate equals sum of the State estimates)

Account	Calculation procedures	Percent of total 1990 expenses
Livestock and poultry purchased	Sum of individual estimates	10.5
Livestock purchased	NASS State value of interstate shipments of cattle, hogs, and sheep (number × average weight × average price)	9.1
Poultry purchased	NASS State number of poultry hatched × average prices	1.4
Interest: nonreal estate and real estate	State debt & average interest rates by lender & type (calculated by ERS balance sheet section)	9.9
Total for category 1/		20.3

1/ Components do not add to total because of rounding.

Table B-2--Expenses for which national estimates are allocated to States by State/U.S. ratios in most recent Census of Agriculture or State/U.S. ratios interpolated between censuses.

Account	U.S. estimate calculation procedure 1/	Percent of total 1990 expenses
Seed purchased	Census/FCRS; benchmark: 0.850	2.6
Pesticides	Census/FCRS; benchmark: 1.128	4.1
Fuel and oil 2/	Census/FCRS; benchmark: 1.040; less administrative Federal and State gasoline tax refunds	4.2
Electricity	Census/FCRS; benchmark: 0.975	1.4
Machine hire and customwork	Census/FCRS; benchmark: 0.967	1.9
Irrigation water (miscellaneous expenses) 3/	FCRS	0.3
Contract labor	Census/FCRS; benchmark: 1.189	1.0
Hired labor: cash wages and benefits, Social Security, and noncash perquisites	FCRS	8.0
Net rent to nonoperator landlords: cash rent 4/	Census/FCRS; benchmark: 1.001	2.0
Personal property taxes 4/	FCRS proportion of total property taxes; total procedure: Census/FCRS; benchmark: see 5/	0.4
Total for category 6/		25.7

1/ "Census/FCRS" national estimates use the Census of Agriculture estimate in the census year and the FCRS estimate times the Census/census-year FCRS benchmark in intercensal years. 2/ Annual administrative Federal and State gasoline tax refunds are subtracted from the Census distribution each year. National-level Federal refunds provided by the Internal Revenue Service are allocated to the States using the census distribution. Refunds given by State governments are calculated directly using Federal Highway Administration data. 3/ Uses 1988 Farm and Ranch Irrigation State/U.S. ratios. 4/ Uses 1988 AELOS State/U.S. ratios. 5/ The Census/FCRS operator taxes benchmark is 0.978; landlord taxes equal operator taxes times 0.730, the 1988 AELOS landlord taxes/operator taxes ratio. 6/ Components do not add to total because of rounding.

Table B-3--Expenses for which national estimates are allocated to States by State/U.S. ratios in most recent Census of Agriculture or State/U.S. ratios interpolated between censuses, modified by movement in indicated data series

Account	National estimate calculation procedure 1/	Census State/U.S. ratios modifier series	Percent of total 1990 expenses
Feed purchased	Census/FCRS; benchmark: 1.091	Livestock & dairy: NASS State value of production; Poultry: NASS State production × ERS national feed cost per unit of production	14.8
Fertilizer and lime	Census/FCRS; benchmark: 0.928	TVA State fertilizer tonnage; NASS regional lime prices	5.1
Net rent to nonoperator landlords: share rent 2/	Field crops: FCRS State cash receipts and inventory change × FCRS/NASS landlord percent; other crops & livestock: FCRS	Value of crop production	3.3
Real estate taxes	FCRS proportion of total property taxes; total procedure: Census/FCRS; benchmark: see 3/	ERS real estate tax survey estimates 3/	3.1
Total for category 4/			26.2

1/ "Census/FCRS" national estimates use the Census of Agriculture estimate in the census year and the FCRS estimate times the Census/census-year FCRS benchmark in intercensal years. 2/ Uses 1988 AELOS State/U.S. ratios. 3/ The Census/FCRS operator taxes benchmark is 0.978; landlord taxes equal operator taxes times 0.730, the 1988 AELOS landlord taxes/operator taxes ratio. 4/ Components do not add to total because of rounding.

Table B-4--Expenses for which national estimates are allocated by annual distribution of the indicated data series

Account	National estimate calculation procedure 1/	Data series used in State distribution	Percent of total 1990 expenses
Repair and maintenance: buildings and land improvements	FCRS proportion of total repair and maintenance; total procedure: Census/FCRS; benchmark: 0.906	ERS State balance sheet values	1.3
Repair and maintenance: autos, trucks, tractors, and farm machinery and equipment	FCRS proportion of total repair and maintenance; total procedure: Census/FCRS; benchmark: 0.906;	Census State number per farm (constant/interpolated); NASS State number of farms	3.8
Motor vehicle insurance, license, and registration (miscellaneous expenses)	FCRS	Census State number per farm (constant/interpolated); NASS State number of farms	0.4
Marketing, storage, and transportation	FCRS	FCRS regional expenses; ERS State cash receipts	2.8
Miscellaneous, excluding motor vehicle insurance, license, and registration and irrigation water	FCRS, except dairy assessment fees: NASS Milk production × dairy assessment fees per unit of production	FCRS; ERS State cash receipts; NASS: State milk production and cattle on feed; State administrative insurance data	8.0
Net rent to nonoperator landlords: direct Government payments to landlords	FCRS landlord percentage share × ASCS total direct Government payments	FCRS regional landlord direct Government payments; ASCS State total direct Government payments	0.6
Capital consumption: buildings and farm machinery and equipment	FCRS capital expenditures; depreciation rates; USDC accidental damage estimates	ERS State balance sheet values	7.1
Capital consumption: autos, trucks, and tractors	FCRS capital expenditures; depreciation rates; USDC accidental damage estimates	Census State number per farm (constant/interpolated); NASS State number of farms	4.1
Total for category 2/			27.8

1/ "Census/FCRS" national estimates use the Census of Agriculture estimate in the census year and the FCRS estimate times the Census/census-year FCRS benchmark in intercensal years. 2/ Components do not add to total because of rounding.

# Measuring Farm And Ranch Business Diversity

by

John E. Jenkins<sup>1</sup>

**Abstract:** This article explores the use of the entropy index for measuring how much U.S. farm and ranch businesses have diversified among enterprises. Cotton farms are shown to be among the most diversified while poultry operations are among the least diversified. Among regions, the Southeast had the most diversified enterprise mix.

**Keywords:** Diversification, entropy

Diversifying into several kinds of crops and livestock may positively or negatively affect the financial performance of the business. Producing several kinds of commodities may smooth out gyrations in the income of a farm business. For example, a farmer producing corn and hogs might earn profits from the hog enterprise during times when the corn crop fails or is unprofitable. On the other hand, a farmer who attempts to manage too many enterprises or expand into new areas without the necessary expertise might find that farm business profitability decreases.

## Diversification Measures

Knowing the pattern of diversification on farms of different types and in different areas of the country provides a tool for sorting out differences in the financial performance of farm businesses. But what is the best way to gauge farm business diversification? Two potential measures are the number of enterprises on a farm and the share that the most important commodity contributes to the total value of production. Although uncomplicated and easy to calculate, these two measures are flawed. The first measure ignores the relative importance of each enterprise to the farm business, while the second measure ignores all but the largest enterprise.

This article uses an entropy index (see box) to gauge how much farmers have divided their efforts among different commodities. Among its advantages, the index:

- accounts for all enterprises and adjusts for the relative importance of each enterprise to the business. An

operation with many enterprises, but with one predominant enterprise, would have a low number on the diversification index. Higher index numbers go to operations that distribute their production more equally among several enterprises.

- has a continuous range between 0 and 100. The value of the index for completely specialized farms, those with only one enterprise, is 0. Farm businesses that divide their efforts equally among all possible enterprises have an index value of 100.

## Enterprise Diversity Varies Greatly Among Types of Farms

To see how the entropy index works, let's compare diversification on different types of farms. In this discussion, the commodity that provides the greatest percentage of income determines

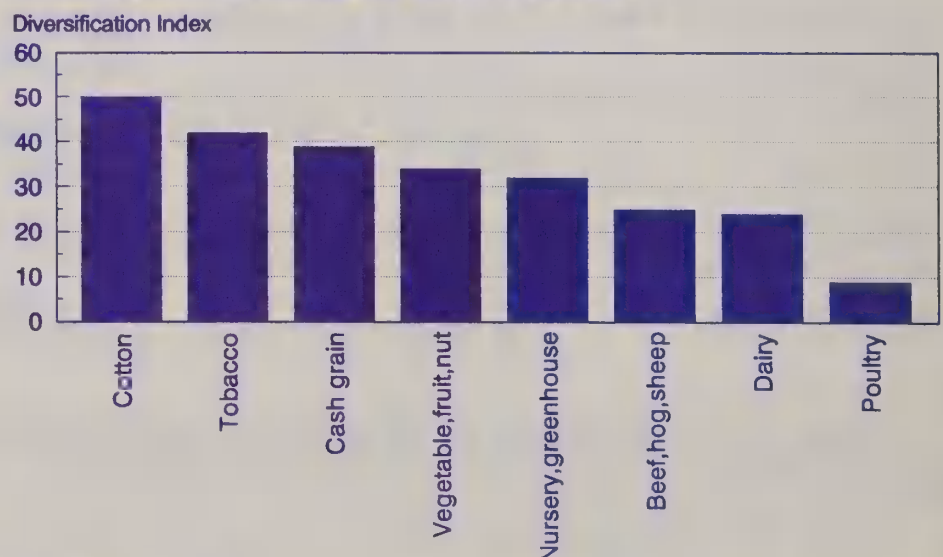
farm type. All the results presented are for commercial farms that produced at least \$40,000 or more worth of commodities in 1990.

With a diversification index of 50, cotton farms are among the most diversified (figure C-1). That's because cotton farms also produce substantial amounts of cash grains and fruits and vegetables, and have some livestock enterprises (table C-1).

For tobacco farms, nine different commodities contribute at least 1 percent of the value of production, compared with just six commodities for cotton. Consequently, it would appear that tobacco farms should have a higher diversification index than cotton farms. However, the index for tobacco farms is lower because they have such a large amount, 76 percent, of their total value of production coming from tobacco.

Figure C-1

### Cotton Farms Are Among The Most Diversified



Source: 1990 Farm Costs and Returns Survey Data - Farms with \$40,000 or more value of production.

<sup>1</sup>Economist, Economic Research Service, USDA.

Table C-1--Percent of value of production from different commodities by farm type

Farmtype	Cotton	Tobacco	Cash grain	Fruits, nuts, and vegetables	Nursery & greenhouse	Beef, hog, sheep	Dairy	Poultry	Other field crops
Percent									
Cotton	62	*	11	18	*	2	*	2	5
Tobacco	1	76	9	1	*	5	1	4	2
Cash grain	1	*	76	4	*	11	1	1	6
Vegetables, fruits, nuts	3	*	4	80	2	1	*	*	9
Nursery, greenhouse	*	*	*	1	57	*	*	*	42
Beef, hogs, sheep	*	*	11	*	*	85	*	1	2
Dairy	*	*	3	*	*	10	85	*	*
Poultry	*	*	*	*	*	3	*	96	*

\* = less than 1 percent of value of production. Row totals may not equal to 100% due to rounding.  
Source: 1990 Farm Costs and Returns Survey data.

About 96 percent of the value of production of poultry operations comes from poultry, explaining why those operations had a diversification index of only 9. No crop made up even 1 percent of the value of production on poultry farms.

### ***The Southeast Is the Most Diversified Region***

The index also can be used to compare different parts of the country. Because every part of the country produces many kinds of livestock and crops, regional diversification indices are generally higher than the indices for farm types (figure C-2).

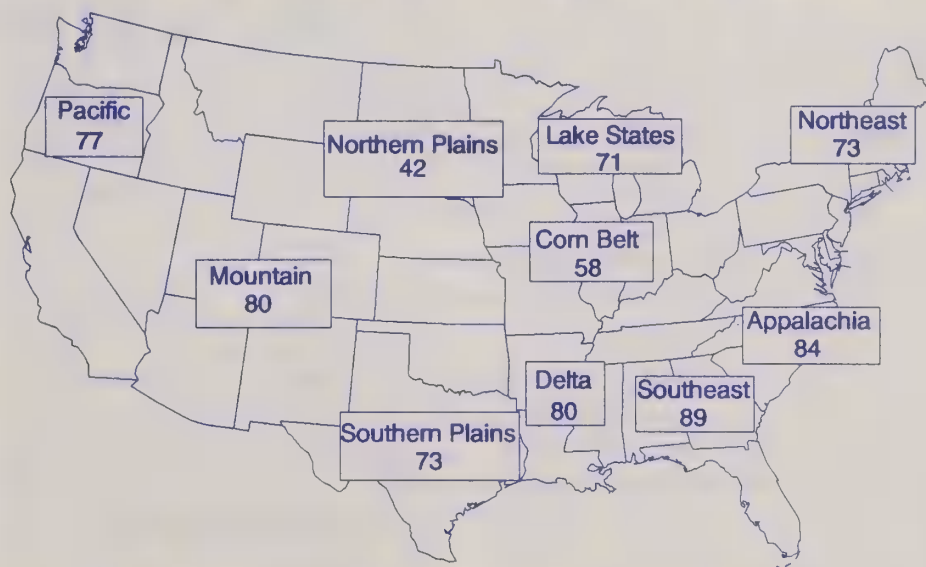
Just two regions, the Corn Belt and Northern Plains, had diversification indices of less than 60. Making up more than 90 percent of the value of commodities produced in the region, the predominance of cash grains and beef, hogs, and sheep in the Northern Plains helps explain why that region had the lowest index number — 42 (table C-2). Compare that with the most diversified region, the Southeast which had an index of 89. In the Southeast, no single commodity group accounted for more than a quarter of the value of production.

### ***Different Measures Tell Different Stories***

A side-by-side comparison with the entropy measure further highlights the weaknesses of the other diversification measures mentioned previously (table

Figure C-2

### **The Entropy Index Shows the Southeast as the Most Diversified Region**



Source: 1990 Farm Costs and Returns Survey Data - Farms with \$40,000 or more value of production.

C-3). The measure using the percent of value of production from the major commodity ranks nursery/greenhouse operations as the most diversified because they have the smallest proportion of value of production, 57 percent, coming from their major enterprise. However, another 42 percent of the value of production of nursery and greenhouse operations comes from other field crops, for a total of 99 percent. The percent of value of production measure cannot compensate for this concentration of production among just two commodity groups.

Using the average number of enterprises on each farm type as the diversification measure also produces faulty rankings. This measure places dairy operations, with an average of 2.4 enterprises per farm, among the most diversified, even though 85 percent of their value of production is from dairy products. This measure fails to take into account that though many dairy farms may have several enterprises, the dairy enterprise usually accounts for the bulk of the value of the commodities produced.

Table C-2--Percent of value of production from different commodities by region

	Cotton	Tobacco	Cash grain	Fruits, nuts, and vegetables	Nursery & greenhouse	Beef, hog, sheep	Dairy	Poultry	Other field crops	Other Live Stock
	Percent									
Northeast	*	7	5	7	13	7	46	13	2	*
Lake States	*	*	22	7	4	21	37	2	5	1
Corn Belt	*	*	48	1	5	31	8	1	5	*
Northern plains	*	*	31	1	*	61	3	*	4	*
Appalachia	1	15	14	5	4	19	11	28	2	1
Southeast	5	4	4	11	14	15	15	24	7	1
Delta	19	*	24	6	1	14	4	25	5	2
Southern plains	13	*	10	5	*	45	11	10	5	*
Mountain	4	*	11	14	3	37	14	4	10	3
Pacific	2	*	4	29	8	11	17	2	26	*

\* = less than 1 percent of value of production. Row totals may not equal to 100% due to rounding.  
Source: 1990 Farm Costs and Returns Survey data.

Table C-3--Farm type rankings may change when different diversification measures are used.

	Entropy Index	Percent value of production from major commodity	Average number of enterprises
Cotton	50	62	2.5
Tobacco	42	76	2.2
Cash grain	39	76	1.9
Veg, fruits & nuts	34	80	1.9
Nursery, greenhouse	32	57	1.2
Beef, hogs, sheep	25	85	1.8
Dairy	24	85	2.4
Poultry	9	96	1.5

Source: 1990 Farm Costs and Returns Survey

## The Entropy Index

The index is calculated by:

$$\text{Entropy Index} = \frac{\sum_{i=1}^N (\text{Percent production from enterprise } i) * \ln(\text{Percent production from enterprise } i)}{\ln(\text{number of possible enterprises})}$$

where  $i$  is each of the  $N$  possible enterprises

Ten possible areas of diversification were considered. The denominator in the equation adjusts the index so that it ranges from 0 to 1. In the tables and graphs, index values are multiplied by 100.

Percent of total sales from each enterprise is another candidate for use when calculating the entropy index. Compared with percent of sales, percent of total value of production has the advantage that it includes all commodities produced, whether sold or not. Commodities that are produced solely to use in producing other commodities, such as hay for feeding cattle, are excluded from value of production to avoid double counting.

For further detail on the entropy index see:

Theil, Henri. *Statistical Decomposition Analysis*, Amsterdam, North-Holland Publishing Company, 1972.

# Economic Well-Being of Farm Operator Households, 1990

by Janet Perry<sup>1</sup>

**Abstract:** In 1990, the average household income for farm operator households was \$39,007, which is comparable to the average U.S. household. About 90 percent of farm operator households received some income from off-farm sources and many operators spent the majority of their work effort in off-farm occupations. A substantially larger percentage of farm operator households than all U.S. households were in the lower income categories. The average net worth of operators' households (including the farm business) was significantly higher than for all U.S. households.

**Keywords:** Farm operator household, household well-being, farm income, off-farm income, female farm operators

Farm operators make the day-to-day decisions for the farm business. They receive net income from agricultural production and their households are the most affected by commodity market conditions and agricultural policy. While USDA data collection efforts traditionally have focused on measurement of the financial condition of the farm business, the net income of the farm business may be a small percentage of the total income available to the farm family.<sup>2</sup>

Just under half the farm operators indicated that their major occupation was something other than farming; that is, they spent the majority of their work time in off-farm pursuits. Thus, an understanding of the economic well-being of operator households requires an accounting for all income, both farm and off-farm. It also needs to recognize the importance of wealth in determining farm operator household well-being.

## Sources of Income

Almost all farm operator households have sources of income other than from the farm business. Whether from acreage that was rented for cash, income earned from off-farm employment, or unearned income such as from interest or dividends, each source of income contributes to the economic well-being of the operator household.

Farm operator household income from all sources averaged \$39,007 in 1990,

<sup>1</sup> Agricultural economist, Economic Research Service, USDA.

<sup>2</sup> For a more detailed account of the data source, definitions and characteristics of farm operator households from 1988 to 1990 see (1).

but varied significantly among individual households (table D-1). Almost 9 percent had negative household income and 22 percent earned \$50,000 or more. Average income for farm operator households is on par with average income for U.S. households, but more operator households than U.S. households are in the lower income categories (2). Six percent of the farm operator households earned \$100,000 or more, compared with 4 percent of U.S. households. Twenty-two percent of the farm operator households had incomes below the official poverty income threshold, compared with 11 percent of all families in the United States<sup>3</sup>.

About 90 percent of total farm production comes from farms with sales over \$50,000, but they account for only 30 percent of operator households. The majority of farms are smaller farms with relatively low farm incomes (table D-2). This diversity in farms prevents characteristics of the average farm from providing a very meaningful picture. For example, average farm income for all

<sup>3</sup> This estimate is higher than the estimate published by the Census (3) for farm families who live on farms.

operator households was \$5,742 in 1990. However, operator households associated with small farms having sales less than \$50,000 on average had negative farm income, while households associated with the largest size farms (those having sales over \$500,000 and generating 29 percent of total production) netted over \$100,000 from their farms.

How dependent are operator households on farm income for their economic well-being? Almost half the operators of farms having sales less than \$50,000 spent most of their work time at off-farm jobs, and only 7 percent of their households had farm income exceeding their off-farm income. On the other hand, less than 10 percent of operators of farms having sales over \$50,000 had a major occupation other than farming. Virtually all operators of the largest size farms (those with sales of \$500,000 or more) had farming as their major occupation. For the majority of households operating farms with sales over \$50,000, farm income had a greater impact than off-farm income on economic well-being of the household.

Table D-1--More farm operator households had income below \$10,000 compared to all U.S. households.

	Farm operator households	U.S. households
Average income (dollars)	39,007	37,403
Percent below poverty threshold	21.9	10.7 1/
Household income (%):		
Less than \$10,000	25.2	14.9
\$10,000-\$24,999	27.2	27.2
\$25,000-\$49,999	28.8	33.3
\$50,000 and over	21.8	24.6

1/ The Census reports poverty level for persons or families. This estimate is for families in the U.S. Source: U.S. Bureau of the Census. Poverty in the United States: 1990, Current Population Reports, Consumer Income Series P-60, No. 175.

Table D-2--Dependence on farm income for economic well-being increases as economic size of farm increases

	Economic size of farm				All Households
	Less than \$50,000	\$50,000-\$249,999	\$250,000-\$499,999	\$500,000 and over	
Percent of operator households	71.9	22.0	4.2	2.0	100.0
Farm income to household (average)	-3,387	16,236	53,314	118,035	5,742
Farm income to household (%):					
Negative	67.7	24.4	20.3	21.0	55.3
\$0 - \$9,999	25.8	13.5	6.1	3.8	21.8
\$10,000 - \$24,999	5.4	24.7	10.5	6.7	9.8
\$25,000 - \$49,999	0.9	25.3	17.0	9.1	7.1
\$50,000 and over	0.2	12.1	46.1	59.4	5.9
Total off-farm income					
For all households (average)	37,276	21,602	25,860	32,698	33,265
Percent reporting income	95.9	82.8	78.9	73.4	91.9
Per reporting household (average)	38,869	26,085	32,756	44,524	36,210
Household income (average)	33,889	37,838	79,174	150,733	39,007
Household income (%):					
Negative	6.4	14.3	13.1	16.3	8.6
\$0 - \$9,999	16.6	6.5	4.4	4.3	13.6
\$10,000 - \$24,999	31.3	19.6	7.8	4.1	27.2
\$25,000 - \$49,999	29.1	31.5	18.6	8.7	28.8
\$50,000 and over	16.6	28.1	56.2	66.6	21.8
Percent of households with income below poverty threshold	22.0	22.5	17.9	20.0	21.9
Operator's major occupation is other than farming (%)	58.2	9.1	4.5	1/	44.0

1/ Less than 1 percent. Source: 1990 Farm Costs and Returns Survey, all versions.

### Farm Operator Household Data from the FCRS

This report, based on information from the annual Farm Costs and Returns Survey (FCRS), focuses on individuals who operate farm businesses and their associated households. The FCRS identifies some 1.7 million farms, about 400,000 less than the official USDA estimate of farm numbers. The difference in the two estimates is largely the result of differences in survey design and population definition.

Farm income to the household does not directly compare to farm business income reported elsewhere. Farm business income received by the household is the percent of the net farm income minus depreciation that is received by the operator's household. The Bureau of the Cen-

sus similarly defines income for those who are self-employed, like farmers. Total farm income to the household includes the share of income the household received from the farm business, wages paid to the operator and household members as a result of working on the farm, rental income received on farmland, and income from another farm business.

Many households share farm income with landlords and other owners of the business. In the case of partnerships or family corporations, the senior operator is one from whom data are collected. This report excludes those farms organized as non-family corporations, cooperatives, or whose hired manager does not receive any of the net income from the business.

Fifty-five percent of the households had losses from their farms; another 22 percent had positive farm income below \$10,000. Many of the operator households that had farm losses had substantial off-farm income. On average, the households reporting negative farm incomes had off-farm income of more than \$40,000 and 58 percent of operators reported that their major occupation was something other than farming. Still, 9 percent of operator households had negative total household income as a result of farm losses. Households with livestock operations were the most likely to report farm losses; households operating dairy farms were most likely to report farm earnings of \$50,000 or more.

In general, households that had low farm income also had lower total household income. For example, the operator households with positive farm earnings under \$10,000 also had household income of less than \$30,000. In contrast, the 6 percent of operator households with farm earnings of \$50,000 and over had average household income greater than \$145,000.

Approximately 30 percent of farms received direct payments from government commodity programs in 1990. The average payment to participating

farm operations was \$9,788. Farms not receiving direct payments had significantly lower average farm income than those who did. However, households associated with non-participating farms had very similar average income compared to households associated with all participating farms, and higher than participants who received less than \$5,000 in government payments.

Households whose farms received the highest average payment from government commodity programs (which is included in our definition of farm income) had the highest average farm household income. For households with farming operations that received less than \$5,000 in payments, the average household income was \$31,130. For farms receiving payments between \$5,000 to \$24,999, direct payments averaged \$11,295 and the associated average household income was \$42,784. Farms businesses receiving commodity program payments of \$25,000 or more had average farm income of \$49,582 and the associated average household income was over \$74,000.

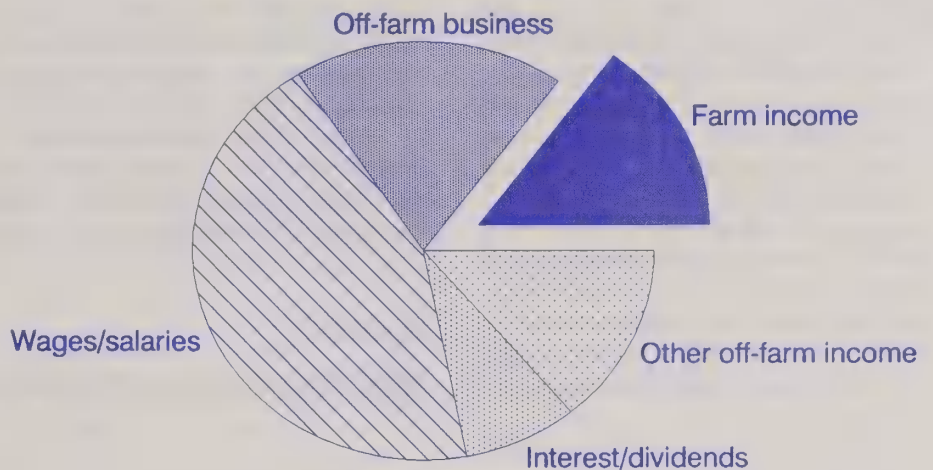
In 1990, 85 percent of average operator household income was from off-farm sources, with most resulting from employment in the off-farm sector (figure D-1). Off-farm income includes wages and salaries from off-farm jobs<sup>4</sup>, income from an off-farm business, interest and dividends, transfer payments, retirement and pension benefits, annuities and gifts. Operator households with large farms (sales of \$500,000 or more) had a greater portion of their average off-farm income coming from an off-farm business and from interest or dividends than those with smaller farms.

#### **FCRS-Farm Operator Resource Version Yields New Information**

Some striking differences were found when operator households were categorized by gender and race of the operator for the first time in the 1990 Farm Operator Resource Version of the FCRS. Female farm operators made up a little less than 6 percent of the estimated FCRS population, similar to that reported by the 1987 Census of Agriculture (4). Females reporting as the major

Figure D-1

#### **Most Operator Households Receive A Majority Of Their Income From Off-Farm Sources**



Source: 1990 Farm Costs and Returns Survey, all versions.

operator had smaller farms both in sales and farm net worth, had lower average farm incomes, and had lower household income than male operators.

Compared with males, a lower percentage of the female operators were married but those who were married, more frequently had spouses who considered themselves farm operators. Characteristic of their smaller farm size, female operators were more likely than male operators to raise livestock, and to own all their land. Female operators were more likely to operate farms in the West and Northeast.

Male operators were more likely to be reared on a farm than females. They also had more years of farming experience than female operators, on the average working as a paid or unpaid farm worker for 10 years, operating other farm land for 4 years, and operating their current acreage 21 years. On average, females reported working as a paid or unpaid worker for 7 years, as an operator of other farm land for 2 years, and as an operator of their current acres for 17 years.

Approximately 6 percent of operators reported their ethnic origin as Hispanic

or a race other than white<sup>5</sup>. Farm income for these operators was less than half and their farm net worth was one-fourth that of white non-Hispanic farm operators. They had lower average household income and their farm income was a lower proportion of the total than for white non-Hispanic operators. In addition, these operators were less likely to report farming as their major occupation and they reported working fewer hours on the farm than non-Hispanic white operators.

Approximately 80 percent of the operators reported being reared on a farm. However, non-white and Hispanic operators had fewer years of work experience on a farm. Non-white and Hispanic operators reported working on a farm an average of 11 years prior to operating any land and 20 years operating a farm, compared with 8 and 25 years, respectively, for white non-Hispanic operators.

<sup>5</sup> Similar to the Census, the FCRS grouped the category "Hispanic origin" with race of the operator. Here, due to sample size considerations, we present two groupings: white operators who are non-Hispanic, and operators who are Hispanic and/or members of all non-white racial groups. The Census reported that approximately 3 percent of operators are either Hispanic or non-white. However, 30 percent of all operators failed to report whether they were of Hispanic origin.

<sup>4</sup> Can include wages received from working on another farm.

## Distribution of Income Across Regions

More farm operator households are in the Midwestern (40 percent) and the Southern (40 percent) regions than elsewhere in the United States (figure D-2). Geographic concentrations of farms are not surprising given the importance of climate, topography, and urbanization to agricultural production. Also, in many regions of the country, the local nonfarm economy provides important off-farm employment opportunities, making it possible for households to operate a farm that by itself would not provide income to support a family.

While farm operator households in the Midwest earned the highest average farm income, they also had the lowest average off-farm income of the four regions (table D-3). As a result, their combined farm and off-farm incomes were somewhat below the average for all farm operator households in 1990. Farms in the Midwest are mainly cash grain operations or beef, hogs or sheep enterprises. Over two-thirds of farms receiving payments from government commodity programs were in the Midwest. Farmers in the Midwestern region were more engaged in and dependent on farming than those in the rest of the country.

Operator households in the Southern region were less dependent on farm income than Midwestern households, with average farm income less than one-quarter that of the Midwest. Due to higher off-farm earnings, total household income was similar to operator households in the Midwest, but below the average for all farm operators. Almost 60 percent of Southern farms were beef, hog, or sheep operations. More than one-fifth of farms receiving pay-

ments from government commodity programs are in the South.

The second highest average farm income went to the 14 percent of operator households located in the West. Combined with the highest off-farm income, these households had average household income of over \$62,000. Western farms were less likely to specialize in cash grains (8 percent) than other crops (37 percent), and 42 percent had beef, hog, or sheep operations. Farms in the

Figure D-2

### Most Farms Operator Households Are in the Midwest and the South

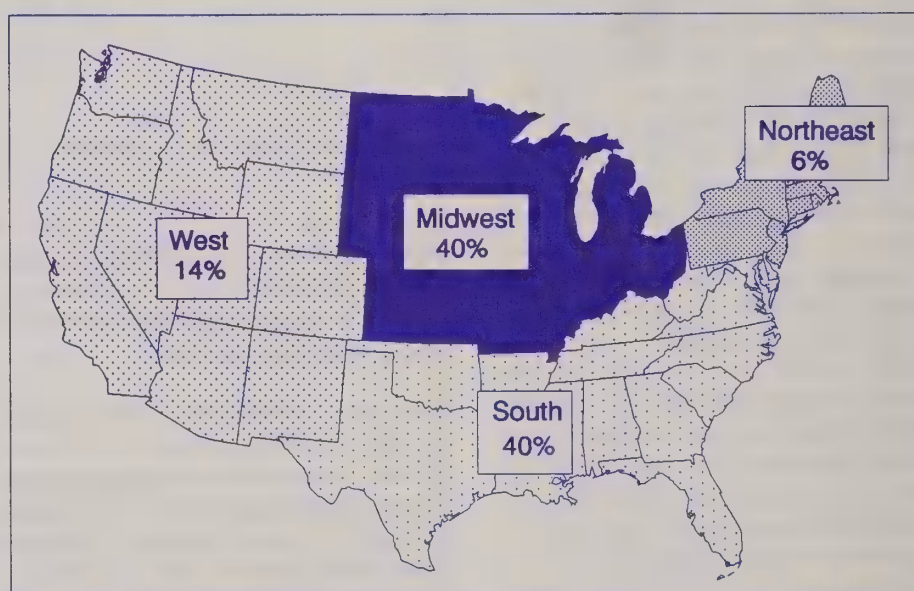


Table D-3--Most farms are in the South and Midwest, but farms in the West had the highest farm net worth, farm income and household income

	Region				All households
	South	West	Northeast	Midwest	
Percent of operator households	40.1	14.0	6.1	39.8	100.0
Farm income to household (average)	2,127	6,712	1,694	9,661	5,742
Total off-farm income					
For all households (average)	33,016	55,877	38,351	24,774	33,265
Percent reporting income	93.4	91.0	89.1	91.0	91.9
Per reporting household (average)	35,331	61,410	43,021	27,223	36,210
Household income (average)	35,143	62,589	40,045	34,435	39,007
Household income (%):					
Negative	6.9	9.7	9.5	9.8	8.6
\$0 - \$9,999	14.5	9.0	17.9	13.6	13.6
\$10,000 - \$24,999	30.8	25.0	23.2	25.0	27.2
\$25,000 - \$49,999	28.0	26.3	27.2	30.7	28.8
\$50,000 and over	19.8	30.0	22.2	21.0	21.8
Farm net worth (average)	276,515	577,160	396,059	290,449	331,506
Net worth (%):					
Negative 1/	1.5	2.3	2/	1.4	1.5
\$0 - \$49,999 1/	15.3	13.7	8.7	11.2	13.0
\$50,000 - \$249,999	52.8	40.7	43.4	49.2	49.1
\$250,000 - \$499,999	18.2	17.0	25.5	22.5	20.2
\$500,000 and over	12.3	26.2	22.4	15.8	16.2

1/ Categories are combined due to disclosure requirements. 2/ Data is not sufficient for disclosure.  
Source: 1990 Farm Costs and Returns Survey, 1990

West were more likely to be organized as partnerships or family corporations than farms in other regions. Operators in this region were the most likely to own all their farmland.

The smallest percentage of farms are located in the Northeast (6 percent). Farm income averaged the lowest for households in this region. Northeastern operator households reported average off-farm income of \$38,351 and average household income of over \$40,000. Farmers in the Northeast were engaged in three main types of farming operations: crops other than cash grains; beef, hogs or sheep; or dairy. Probably because of the high percentage of dairy operations in the Northeast, the average number of hours worked by the operator was the highest of the four regions.

### Net Worth of Farm and Household

Because operator households experience a great deal of variation in income from year to year and have relatively large net worth, a single year's income is a less exact measure of economic well-being than it is for non-farm households.

Farm wealth represents an investment for future earnings, while most U.S. households rely primarily on their human capital to produce a future income stream. As a result, farm households are wealthier than the average U.S. household when the farm business is included in the household net worth. Even operator households reporting low farm income have relatively high net worth (figure D-3).

The average farm business net worth of farm operator households in 1990 was \$350,883. In the Midwest and South, where most farms are located, the average farm net worth was 12 and 17 percent lower respectively, than the average for all operator households. In the West, household net worth was almost twice the operator household average. Farm net worth increases with age: operators under 35 operate farms with a net worth of about \$185,000 and operators age 65 or older operate farms with an average net worth over \$367,000.

The operator household total net worth from farm and off-farm capital was

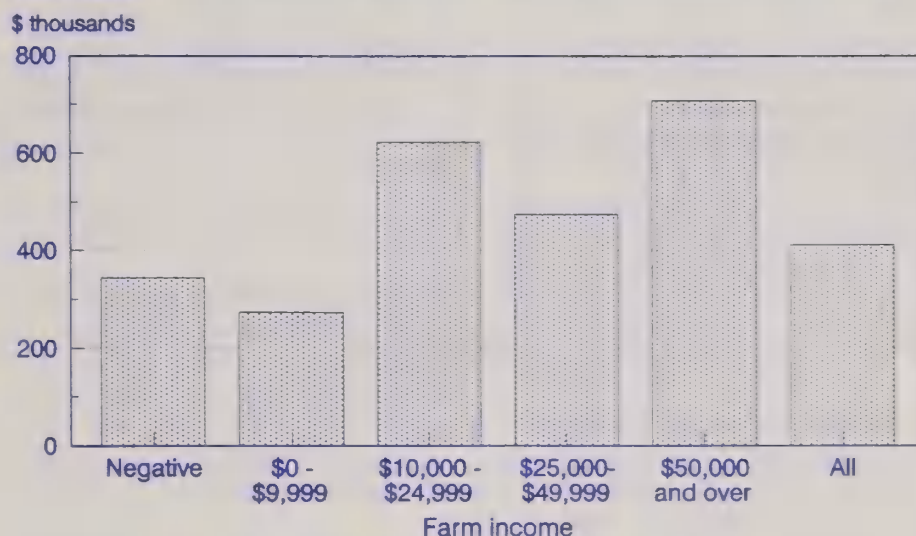
\$411,681. About one-third of the operator households had total net worth of \$250,000 or more, compared with 9 percent of all U.S. households. Net worth increases with the size of farm, and operator households with net worth over \$250,000 accounted for more than 80 percent of the wealth of all operator households (figure D-4).

Only 2 percent of the operator households had negative net worth, compared with 11 percent of all U.S. households.

The wealth position of operator households with income below the poverty threshold was very similar to those with annual income above the poverty threshold. However, in a forthcoming report, we have identified approximately 200,000 farm households with low household income, low farm sales, and few farm assets. These farms households have not prospered financially on or off their farms and their farms have little potential to generate significant farm income.

Figure D-3

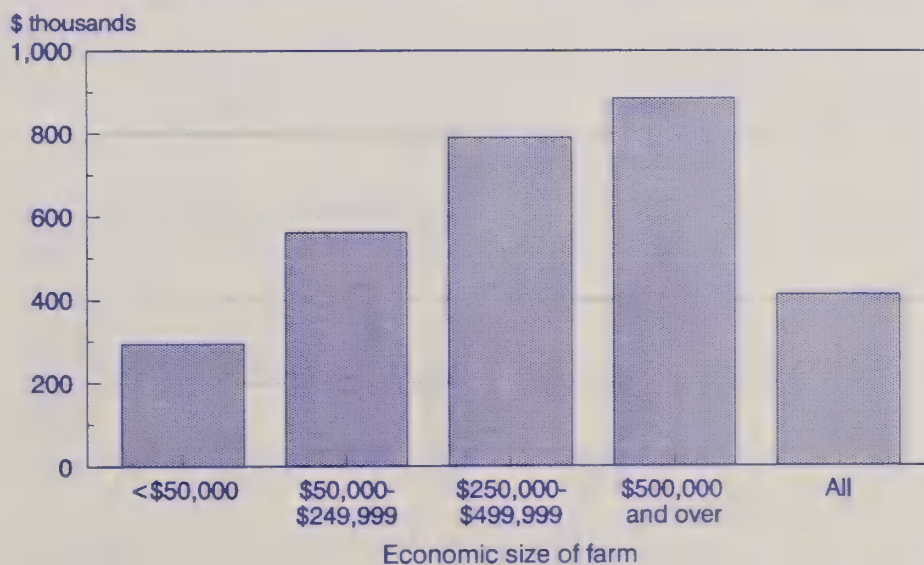
### Household Net Worth and Average Farm Income Are Not Always Correlated



Source: 1990 Farm Costs and Returns Survey, Farm Operator Resource Version.

Figure D-4

### Household Net Worth Increases with Economic Size of Farm



Source: 1990 Farm Costs and Returns Survey, Farm Operator Resource Version.

## Conclusions

Average household income for farm operator households was \$39,007 in 1990, which is comparable with the average U.S. household. Almost all farm operator households receive some type of income from off-farm sources and many operators spend the majority of their work time in off-farm jobs. Because farming is so diverse, the average farm income of \$5,742 does not provide a very meaningful picture of the well-being of farms and operator households. Households operating small farms, on average, had negative farm income, while households associated with the largest size farms received over \$100,000 from their farm businesses.

The average farm operator household is wealthier than the average U.S. household. Household net worth (including

the farm business) was over \$400,000 and even the smaller farm households had net worth of almost \$300,000. This fact makes income alone a less satisfactory measure of economic well-being for farm operator households. At the same time it is important to recognize that farm businesses require significant assets to produce future income, and continuing farm income losses could jeopardize a household's opportunities to remain in farming.

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# Educational Attainment of Farm Operators

by Donald Bellamy<sup>1</sup>

**Abstract:** The educational attainment of farm operators rose from 34 percent having completed high school in 1964 to 76 percent in 1990. Farmers still lag the U.S. population in completion of college.

**Keywords:** Educational attainment, age, farm household income.

Education's role in society is economic, social, and cultural. It provides knowledge and skills that lead to future earnings, enhances the ability to adapt to changing environments, and improves human capital resources. In agriculture, the management component of human capital is responsible for the acquisition, use, and maintenance of physical capital.

The human capital of farmers, both current and the changes over time, is important in the basic structure of the sector. For example, the ability of farmers to adapt efficiently to an economic environment that has been altered in a specific way may be a scarce resource in agriculture (4). Education increases the efficiency in farm population labor services (2); and human capital variables explain work off the farm (3). The latter issue is critical to the survival of family farming in the U.S., where off-farm income makes up the majority of income of the farm family (1). Dependence on off-farm income will likely only increase, and hence, farmers will be competing more directly in the workplace with nonfarmers for job opportunities. How well they compete will be determined in part by their education.

## Educational Attainment

The level of formal education attained by farm operators has increased over the past few decades. For example, the proportion of operators who had not completed high school was cut in half between 1964 and 1978 (table E-1). It was cut another third by 1987. In 1964, only about one-third of the farm operators had completed at least 4 years of high school, compared with more than three-quarters in 1987. Also by 1987, nearly 13 percent of the farm operators had completed 4 or more years of college, up from only 4 percent in 1964.

The education gap between farmers and the U.S. population closed between 1964 and 1987. In 1964, 34 percent of farmers had completed high school, compared with 41 percent of the U.S. population in 1960. By 1987, three-quarters of both groups had completed high school, with estimates nearly the same through 1990 (table E-1).<sup>2</sup> However, the U.S. population completing a college degree and beyond surpassed that of farm operators (figure E-1), 20 percent to 13 percent by 1988.

## Links Between Education and Age

The educational distribution of farmers is closely linked to age. Compared with the general U.S. adult population, a greater proportion of farmers are in the older age categories, and the average age of these farm operators and the U.S. population has increased, but the in-

crease has been even greater for farmers. In 1890, only about 25 percent were 55 or older, but by 1987 this group made up nearly 45 percent of all operators (table E-2). However, 20 percent of the U.S. adult population (25 and over) was 55 and older in 1890, but by 1990, the proportion was 33 percent. The difference in the age structure is even more striking when you compare farmers to just the U.S. population who are employed. Only a small proportion of the U.S. population is employed as farmers. Unlike farm operators and the general U.S. population becoming older on average, the U.S. employed population has become younger since 1950. In 1950, 17 percent of the U.S. employees were 55 years of age or older, and by 1990 the proportion was 12.5 percent.

The middle age category of 45 to 54 years old has had a fairly constant share of the operator population, but all of the younger categories have seen declines. The generally older distribution of farmers can be partly explained by the financial difficulties younger adults face entering farming, largely as a result of start-up costs and the low expected returns. In addition, the farm is generally the family home for the majority of

<sup>2</sup> Ideally, it would be more feasible to use householders rather than persons 25 and older because most farm operators are householders. However, because of changes in data reporting over the years, it was not possible to present data for householders. Differences are not large between educational attainment of persons and householders.

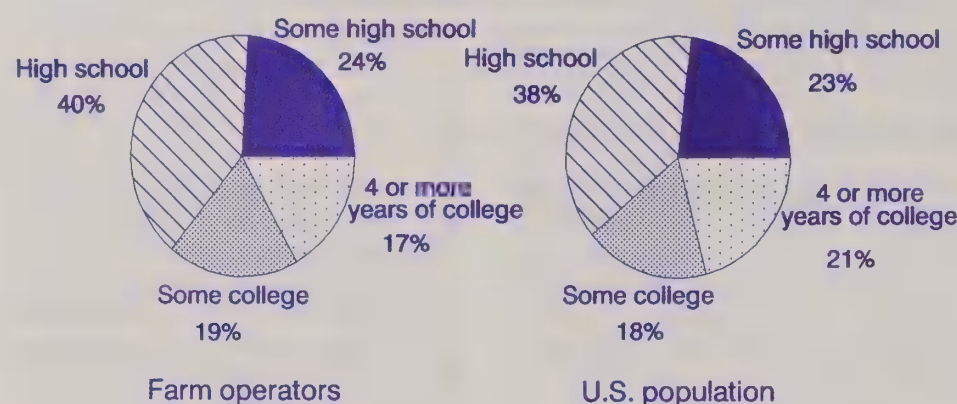
Table E-1--Education of farm operators is similar to that of the U.S. population except for those with a college degree or more

	Some high school	High school	Some college	College degree or more
Farm operators				
1964	65.8	24.2	5.7	4.4
1979	34.3	38.0	18.3	9.4
1988	24.0	41.6	21.8	12.7
U.S. population 1/				
1960	58.9	24.6	8.8	7.7
1970	47.7	31.1	10.6	10.7
1975	37.5	36.2	12.4	13.9
1978	34.1	36.1	14.1	15.7
1980	31.4	36.8	14.9	17.0
1987	24.4	38.7	17.1	19.9
1988	23.7	38.9	17.0	20.3
1989	23.1	38.5	17.3	21.1
1990	22.5	38.4	17.9	21.3

1/ Includes only those persons 25 and over.  
Source: U.S. Bureau of the Census, U.S. Census of Agriculture, and Current Population Reports, Series P-20, various years (5,6,7)

<sup>1</sup> Agricultural Economist, Economic Research Service, USDA.

Figure E-1

**Fewer Farm Operators Complete 4 Years or More of College**

Source: U.S. Bureau of the Census, Current Population Reports, Series P-20, 1990 forthcoming and Farm Costs and Returns Survey.

Table E-2--Average farm operator has become older since 1890 1/

	Under 25 years	25-34 years	35-44 years	45-54 years	55-64 years	65 and over
	Percent					
1890	4.6	22.7	24.8	21.7	26.2	1/
1900	4.9	21.2	25.0	23.0	15.3	10.6
1910	6.6	22.3	24.8	22.6	14.9	8.7
1920	6.0	20.9	24.9	23.3	15.6	9.2
1930	6.1	17.3	23.9	24.0	17.5	11.1
1940	4.0	16.3	21.4	24.5	19.7	14.2
1945	2.5	14.7	22.8	24.7	20.2	15.0
1950	3.2	15.7	23.5	22.9	19.8	14.8
1954	1.9	13.2	23.4	24.6	20.3	16.6
1959	1.7	11.0	22.0	26.7	21.8	16.8
1964	1.7	9.8	20.7	27.0	23.5	17.4
1969	1.9	10.0	19.1	26.5	25.8	16.6
1974	2.3	10.5	17.6	25.3	25.8	18.5
1978	3.2	13.0	19.6	24.0	23.7	16.5
1982	2.8	13.1	19.8	22.5	23.9	17.8
1987	1.7	11.6	19.7	21.8	23.7	21.4

1/ For 1890, age groups 55 and over are all aggregated under 55 to 64 years. Alaska and Hawaii are not included for 1890 to 1920.

Source: Numbers for 1890 to 1974 are from the 1974 Census of Agriculture and the numbers for 1978 to 1987 are from the Census of Agriculture for the respective years.

farm operators, and, since farmers are usually self-employed, the process for retirement can be a gradual one.

Although the somewhat older age distribution of farmers helps to explain their lower rate of college completion as a group, age differences are not the major reasons for differences in educational attainment. Every age group of farmers has lower rates of college completion than the general U.S. population.

In 1990, more than 40 percent of the farm operators 65 and older ended their formal education with less than high school (table E-3). The age bracket of farmers with the greatest formal education was 35 to 44. More than 90 percent of the 35 to 44 age bracket completed high school and one-quarter of them earned a 4-year college degree or more.

On average, while more than 22 percent of the U.S. population completed a college degree and beyond in 1990, only 16 percent of the farm operators completed

a college degree and beyond (table E-4). The oldest age bracket of 65 years or older had similar college completion rates, but all of the younger age brackets of farmers were less likely to complete college than U.S. householders.

**Household Income**

In 1990, the average farm operator household income was \$39,007, and a major part was earned from off-farm sources (1). A great deal of variation exists in the distribution of income by education and age of farm operators.

As educational attainment increases, average household income increases. In 1990, total household income for farm operators who had not graduated from high school was \$23,188, only two-thirds as much as those who ended their formal education with a high school degree. Farm income was only \$3,825 for those operators without a high school degree, while earnings from off-farm sources were \$19,363. The less educated farmers earned less from the farm on average and spent less time working on the farm, with the exception of farm operators with a college degree and beyond, than other operators.

Average farm income was \$6,481 for households where the operator ended his or her formal education with high school. The household earned \$26,719 (80 percent) from off-farm sources for a total household income of \$33,200 in 1990.

Household income for the nearly 300,000 operators with a 4-year degree or more was \$69,371. Earnings from the farm were only \$5,023 on average for the operator with a degree or more, in comparison to \$64,348 (93 percent) of total household income from off-farm sources.

Differences in household income are less pronounced for farm operators by age groups. As age increased, income earned from the farm generally declined. However, this was not true for nonfarm income. Younger farmers (under 35) spent more time spent working on the farm, and had the lowest average household off-farm income. Average off-farm income increased until the middle age group of 45 to 54 and then declined for the older age brackets. Op-

Table E-3--Education of farm operators by age, 1990

Age	Some high school	High school	Some college	College degree or more
Percent				
Less than 35	12.1	47.8	27.2	12.8
35-44	9.1	37.4	27.8	25.6
45-54	17.1	44.2	19.9	18.7
55-64	30.4	42.4	14.6	12.7
65 and over	44.3	33.8	10.2	11.8
Total	24.1	40.5	19.0	16.5

Source: 1990 Farm Costs and Returns Survey.

Table E-4--Education of U.S. householders by age, 1990

Age	Some high school	High school	Some college	College degree or more
Percent				
15-24	18.2	42.9	25.0	13.9
25-34	13.1	38.7	22.0	26.3
35-44	11.3	35.1	23.0	30.6
45-64	24.4	36.2	16.4	22.9
65 and over	45.6	31.2	10.8	12.4
Total	23.3	35.8	18.3	22.6

Source: U.S. Bureau of the Census, Current Population Reports, Series P-20, forthcoming.

erators between 45 and 54 earned \$43,437 from off-farm sources in 1990, 87 percent of total household income. For the 55-and-over groups, the amount of off-farm income was similar.

### Conclusion

Educational attainment has risen for farm operators and the U.S. population as a whole since the 1960's. Although the educational gap has decreased, farmers still lag the U.S. population

somewhat in completion of college. Farm operator households depend increasingly on off-farm income. Since most of the off-farm income is earned through wage and salary jobs, formal education is likely more important to farm operator households than ever before.

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Appendix table 1--Farm income, assets and debt, and returns, 1987-92

Item	1987	1988	1989	1990	1991P	1992F
Billion dollars						
Income and total returns:						
1. Gross farm income 1/	164	169	180	186	183	180 to 184
2. Wages and perquisites to hired labor	9	9	10	11	12	12 to 13
3. Other operating expenses, excluding interest	80	84	89	92	90	89 to 93
4. Capital consumption	15	15	16	16	16	15 to 17
5. Net income from assets and operators' labor and management (1-2-3-4) 2/	60	61	65	68	65	60 to 64
6. Income imputed to operators' labor and management	24	25	26	29	31	28 to 32
7. Residual income to assets (5-6)	36	36	39	39	34	30 to 34
8. Real capital gain to assets	21	10	-19	-22	-30	-18 to -22
9. Total return from assets (7+8)	57	46	26	16	21	10 to 14
10. Interest paid	15	14	14	14	14	12 to 14
11. Real capital gain to debt	7	5	6	7	4	3 to 5
12. Total return to equity (9-10+11)	49	37	12	10	-6	1 to 3
13. Real capital gain to assets and debt (8+11)	28	15	-13	-15	-26	-14 to -18
14. Residual income to equity (12-13)	21	22	25	25	21	16 to 20
Balance sheet: 3/						
15. Assets	773	801	830	850	846	845 to 855
16. Debt	144	139	137	137	139	137 to 143
17. Equity (15-16)	628	662	693	713	707	710 to 720
Percent						
Rates of return and interest rates:						
18. Rate of return on assets (ROA) (7/15)	4.8	4.5	4.8	4.6	4.0	3 to 4
19. Real capital gain on assets (8/15)	2.8	1.3	-2.3	-2.6	-3.5	-2 to -3
20. Total real return on assets (18+19)	7.6	5.8	2.5	2.0	0.5	1 to 2
21. Av. interest rate paid on debt (10/16)	9.6	10.0	10.3	10.1	9.8	9 to 10
22. Real capital gains on debt (11/16)	4.6	3.7	4.4	4.8	2.9	2 to 3
23. Real cost of debt (21-22)	5.0	6.3	5.8	5.3	6.9	6 to 7
24. Rate of return on equity (ROE) ((7-10)/17)	3.6	3.3	3.7	3.6	2.9	2 to 3
25. Real capital gain on equity ((8+11)/17)	4.6	2.4	-1.9	-2.2	-3.7	-2 to -3
26. Total real return on equity (24+25)	8.2	5.7	1.8	1.4	-0.8	0 to 1
27. Net return on assets (NROA) (18-21)	-4.8	-5.5	-5.5	-5.5	-5.8	-5 to -6
28. Spread (20-23) 4/	2.5	-0.5	-3.3	-3.3	-6.4	-5 to -6

P = preliminary, F = forecast. Numbers may not add due to rounding. 1/ Excludes operator dwellings. 2/ Numbers in parentheses indicate components required to calculate a given item. 3/ Excludes operator households and CCC activity. 4/ When total real rate of return on assets exceeds total real cost of debt, debt financing is profitable.

Appendix table 2--Farm income and cash flow statement, 1987-92

Item	1987	1988	1989	1990P	1991F	1992F
Billion dollars						
Farm income sources:						
1. Cash receipts	141.8	151.1	160.9	170.0	168	164 to 169
Crops 1/	65.8	71.6	76.8	80.4	82	81 to 84
Livestock	76.0	79.4	84.1	89.6	86	83 to 85
2. Direct Government payments	16.7	14.5	10.9	9.3	8	8 to 9
Cash Government payments	6.6	7.1	9.1	8.4	8	8 to 9
Value of PIK commodities	10.1	7.4	1.7	0.9	0	0 to 1
3. Farm-related income 2/	6.6	6.3	8.1	6.7	7	6 to 8
4. Gross cash income (1+2+3) 3/	165.0	171.9	179.9	186.0	183	179 to 186
5. Nonmoney income 4/	5.6	6.1	6.1	6.3	6	5 to 7
6. Realized gross income (4+5)	170.6	178.0	186.0	186.0	183	179 to 186
7. Value of inventory change	-2.3	-3.5	4.3	2.9	-1	1 to 4
8. Total gross income (6+7)	168.4	174.5	190.3	195.1	188	187 to 194
Production expenses:						
9. Cash expenses 5/ 6/	109.8	114.5	120.5	124.2	125	125 to 130
10. Total expenses	128.7	133.9	140.2	144.3	146	146 to 151
Income statement:						
11. Net cash income 1/ 6/						
Nominal (4-9)	55.3	57.4	59.4	61.8	58	51 to 58
Deflated (1987\$) 7/	47.8	47.3	47.0	54.8	49	42 to 49
12. Net farm income 1/						
Nominal (8-10)	39.7	40.6	50.1	50.8	42	37 to 45
Deflated (1987\$) 7/	33.8	33.5	39.6	45.0	36	31 to 38

P = preliminary, F = forecast. Totals may not add due to rounding. 1/ Includes net CCC loans. 2/ Income from custom work, machine hire, farm recreational activities, forest product sales, and miscellaneous sources. 3/ Numbers in parentheses indicate components required to calculate a given item. 4/ Value of home consumption of farm products and imputed rental value of farm dwellings. 5/ Excludes depreciation and hired labor perquisites. 6/ Excludes farm households. 7/ Deflated by the GDP implicit price deflator.

Appendix table 3--Relationship of net cash to net farm income, 1987-92

Item	1987	1988	1989	1990P	1991F	1992F
Billion dollars						
Gross cash income	165.0	171.9	179.9	186.0	183	179 to 186
Minus: Cash expenses	109.8	114.5	120.5	124.2	125	125 to 130
Equals: Net cash income	55.3	57.4	59.4	61.8	58	51 to 53
Plus: Nonmoney income:						
Gross rental value of dwelling	4.9	5.4	5.5	5.5	6	5 to 7
Value of home consumption	.8	.8	.7	.7	1	0 to 1
Value of inventory change	-2.3	-3.5	4.3	2.9	-1	1 to 4
Minus: Noncash expenses:						
Depreciation & accidental damage	16.7	17.1	17.6	17.5	18	17 to 19
Labor perquisites	.5	.5	.5	.5	1	0 to 1
Minus: Household expenses 1/	1.7	1.8	1.7	1.9	2	1 to 3
Equals: Net farm income	39.7	40.6	50.1	50.8	42	37 to 45

P = preliminary, F = forecast. Totals do not add due to rounding. 1/ Includes expenses related to operator dwellings.

Appendix table 4--Cash receipts, 1987-92

Item	1987	1988	1989	1990P	1991F	1992F
Billion dollars						
Crop receipts: 1/						
Food grains	5.8	7.5	8.2	7.9	7	7 to 10
Wheat	5.0	6.4	7.3	6.8	6	6 to 8
Rice	.7	1.1	.9	1.1	2	1 to 2
Feed grains and hay	14.6	14.3	17.1	19.1	19	17 to 21
Corn	9.9	8.9	11.4	13.7	14	12 to 16
Sorghum, barley, and oats	2.1	2.2	2.3	2.0	2	1 to 3
Oil crops	11.3	13.5	11.9	12.4	13	11 to 13
Soybeans	10.0	12.1	10.5	10.9	11	10 to 12
Peanuts	1.0	1.1	1.1	1.3	1	1 to 2
Cotton lint and seed	4.2	4.5	5.0	5.2	6	4 to 6
Tobacco	1.8	2.1	2.4	2.7	3	2 to 4
Fruits and nuts	8.1	9.2	9.3	9.3	10	10 to 13
Vegetables	9.9	9.8	11.5	11.5	12	10 to 14
Greenhouse & nursery	6.8	7.1	7.6	8.1	8	7 to 9
Other crops 1/	3.4	3.7	3.8	4.0	4	3 to 5
TOTAL CROPS	65.7	71.5	76.8	80.4	82	81 to 84
Livestock receipts:						
Red meats	44.5	46.5	46.9	51.7	50	43 to 53
Cattle and calves	33.6	36.8	36.9	39.7	39	35 to 40
Hogs	10.3	9.2	9.5	11.5	11	8 to 11
Sheep and lambs	.6	.5	.5	■	*	0 to 1
Poultry and eggs	11.5	12.9	15.4	15.3	15	14 to 16
Broilers	6.2	7.4	8.8	8.4	8	7 to 9
Turkeys	1.7	2.0	2.2	2.4	2	2 to 3
Eggs	3.2	3.1	3.9	4.0	4	2 to 4
Other poultry	.4	.4	.5	.5	■	0 to 1
All dairy products	17.7	17.6	19.4	20.2	18	17 to 21
Other livestock	2.3	2.4	2.5	2.5	3	2 to 3
TOTAL LIVESTOCK	76.0	79.4	84.1	89.6	86	83 to 85
TOTAL RECEIPTS	141.8	151.1	160.9	170.0	168	164 to 169

P = preliminary. F = forecast. ■ = less than \$500 million. Totals may not add due to rounding. 1/ Includes sugar, seed, and other misc. crops.

Appendix table 5--Farm income distribution by enterprise type, 1990-92 1/

Item	Crops					Livestock			
	Total crops	Cash grain 2/Tobacco	Cotton	Fruit/nut/vegetable		Total livestock	Red meat	Poultry and eggs	Dairy
	Thousands								
Number of farms:									
1990	837	426	87	24	108	1,303	993	38	169
1991	823	419	86	24	106	1,282	976	38	167
1992	812	413	84	23	105	1,264	963	37	164
Income:	Billion dollars								
1. Cash receipts--									
Crops									
1990	73.0	31.9	2.9	6.1	17.7	7.4	5.8	0.1	1.3
1991	74.6	31.9	3.0	6.8	18.4	7.4	5.8	0.1	1.4
1992	75	32	3	6	19	8	6	1	1
Livestock									
1990	6.1	4.7	0.5	0.2	0.2	83.6	44.0	14.0	22.5
1991	5.8	4.6	0.5	0.2	0.2	79.9	42.9	13.4	20.6
1992	6	4	1	1	2	70	41	13	21
2. Direct Government payments--									
1990	6.6	5.3	0.1	0.7	0.1	2.7	2.0	0.0	0.6
1991	5.8	4.6	0.1	0.6	0.1	2.4	1.7	0.0	0.6
1992	6	5	1	1	1	3	2	1	1
3. Gross cash income-- 3/									
1990	89.0	43.2	3.5	7.4	18.6	97.1	53.4	14.2	25.4
1991	89.7	42.4	3.7	8.0	19.4	93.2	52.1	13.6	23.5
1992	90	43	4	7	20	92	50	13	24
4. Cash expenses--									
1990	54.8	26.2	2.7	3.5	8.0	69.4	38.3	8.5	18.7
1991	56.2	26.6	2.8	3.6	8.3	69.1	38.0	8.5	18.7
1992	58	27	3	4	9	70	38	9	19
5. Net cash income--									
Current dollars 4/									
1990	34.2	17.1	0.8	3.9	10.7	27.7	15.1	5.7	6.8
1991	33.5	15.8	0.9	4.3	11.1	24.1	14.1	5.2	4.8
1992	32	16	1	3	12	22	12	5	5
Deflated (1987\$)									
1990	30.3	15.1	0.7	3.4	9.5	24.5	13.3	5.0	6.0
1991	28.7	13.5	0.8	3.7	9.5	20.6	12.0	4.4	4.1
1992	27	13	1	3	10	18	10	4	4
Balance Sheet 5/									
6. Farm assets--									
Real estate									
1990	258.8	116.3	11.9	7.7	69.8	355.6	250.8	10.7	56.5
1991	262.2	117.8	12.0	7.8	70.7	360.2	254.1	10.8	57.2
1992	264	119	12	8	71	362	256	11	58
Nonreal estate									
1990	88.9	53.3	3.9	4.3	10.5	131.3	87.0	2.4	33.3
1991	90.2	54.0	3.9	4.3	10.7	133.2	88.3	2.5	33.8
1992	92	55	4	4	11	136	90	3	34
7. Total liabilities--									
1990	62.5	36.7	2.5	3.2	8.4	74.0	43.1	3.9	22.2
1991	63.6	37.4	2.5	3.3	8.6	75.3	43.8	3.9	22.6
1992	64	38	3	3	9	76	44	4	23
8. Debt-to-asset ratio--									
	Percent								
1990	18.0	21.6	15.7	27.1	10.5	15.2	12.7	29.4	24.7
1991	18.1	21.7	15.8	27.2	10.5	15.3	12.8	29.5	24.8
1992	18.1	21.7	15.8	27.1	10.5	15.3	12.8	29.6	24.7

1990 preliminary, 1991 and 1992 forecast. \* = less than \$500 million. Numbers may not add due to rounding.  
 1/ Farm types are defined as those with 50 percent or more of the total value of production accounted for by a specific commodity or commodity group. 2/ Includes farms earning at least half their receipts from sales of wheat, corn, soybeans, rice, sorghum, barley, oats, or a mix of cash grains. 3/ Equals 1 + 2 + farm related income. 4/ Equals 3 - 4. 5/ Excludes farm households.

Appendix table 6--Farm production expenses, 1987-92

Item	1987	1988	1989	1990P	1991F	1992F
Billion dollars						
Farm-origin inputs	32.6	36.5	37.7	39.0	38	36 to 41
Feed	17.5	20.4	21.0	20.7	20	18 to 22
Livestock	11.8	12.8	13.1	14.8	14	12 to 14
Seed	3.3	3.4	3.6	3.6	4	3 to 5
Manufactured inputs	18.1	18.9	19.9	19.7	21	20 to 23
Fertilizer	6.5	6.9	7.2	7.2	7	6 to 8
Fuels and oils	5.0	5.1	5.2	5.0	6	5 to 7
Electricity	2.2	2.3	2.0	2.0	2	1 to 3
Pesticides	4.5	4.6	5.4	5.4	6	5 to 7
Total interest charges	15.0	14.7	14.7	14.7	14	13 to 15
Short-term interest	6.8	6.8	6.9	6.9	7	6 to 8
Real estate interest	8.2	7.9	7.8	7.8	7	6 to 8
Other operating expenses	34.2	34.4	37.5	38.7	41	41 to 46
Repair & maintenance	6.8	6.8	7.3	7.3	8	7 to 9
Labor expenses	10.0	10.4	11.1	12.5	14	13 to 17
Machine hire & custom work	2.1	2.4	2.7	2.6	3	2 to 4
Animal health	1.3	1.3	1.5	1.5	2	1 to 2
Marketing, storage & transportation	4.1	3.5	4.1	4.0	4	3 to 5
Misc. operating expenses	9.7	10.0	10.9	10.7	11	10 to 14
Other overhead expenses	28.9	29.4	30.6	31.3	32	31 to 34
Capital consumption	16.7	17.1	17.6	17.5	18	17 to 19
Taxes	4.9	4.8	5.1	5.6	6	5 to 7
Net rent to nonoperating landlords	7.3	7.4	7.9	8.2	8	7 to 9
TOTAL PRODUCTION EXPENSES	128.7	133.9	140.2	144.3	146	146 to 151
Cash expenses 1/	109.6	114.4	120.5	124.2	125	125 to 130

P = preliminary, F = forecast. 1/ Cash expenses equal total expenses minus depreciation, operator dwelling expenses, and noncash labor benefits.

Appendix table 7a--Balance sheet of the farming sector, excluding operator households, December 31, 1987-92

Item	1987	1988	1989	1990P	1991F	1992F
Billion dollars						
Farm assets	772.8	801.1	829.7	850.0	846	845 to 855
Real estate 1/	578.9	595.5	615.1	628.0	622	620 to 630
Livestock and poultry	58.0	62.2	66.2	70.9	68	70 to 74
Machinery and motor vehicles	80.0	82.0	85.8	87.4	89	88 to 92
Crops stored 2/	17.8	22.7	23.3	22.4	23	20 to 24
Purchased inputs	3.0	3.3	2.7	2.8	3	2 to 4
Financial assets 3/	35.1	35.4	36.6	38.5	40	39 to 43
Farm debt	144.4	139.4	137.1	136.5	139	137 to 143
Real estate 4/	82.4	77.6	75.3	73.4	75	73 to 77
Nonreal estate	62.0	61.7	61.8	63.1	64	63 to 67
Total farm equity	628.4	661.7	692.6	713.5	707	710 to 720
Percent						
Selected ratios:						
Debt-to-asset	18.7	17.4	16.5	16.1	16.4	16 to 17
Debt-to-equity	23.0	21.1	19.8	19.1	19.6	19 to 20
Debt-to-net cash income	260.9	242.9	230.7	220.8	241.1	250 to 260

P = preliminary, F = forecast. 1/ Excludes value of operator dwellings and includes real estate values not included in the 1987 Census of Agriculture and other ERS real estate series. 2/ Non-CCC crops held on farm plus value above loan rate for crops held under CCC. 3/ Excludes time deposits and savings bonds. 4/ Includes CCC storage and drying facility loans.

Appendix table 7b--Balance sheet of the farming sector, including operator households, December 31, 1987-92

Item	1987	1988	1989	1990P	1991F	1992F
Billion dollars						
Farm assets	911.5	952.0	986.8	1,007.9	1,003	1,005 to 1,015
Real estate 1/	658.6	682.1	703.5	712.6	703	700 to 710
Livestock and poultry	58.0	62.2	66.2	70.9	68	70 to 74
Machinery and motor vehicles	84.5	86.7	90.2	91.7	93	92 to 96
Crops stored 2/	17.8	22.7	23.3	22.4	23	20 to 24
Purchased inputs	3.0	3.3	2.7	2.8	3	2 to 4
Household goods	32.9	37.0	42.2	46.3	49	49 to 53
Financial assets	56.7	58.0	58.7	61.2	63	62 to 66
Farm debt	153.7	148.5	146.0	145.0	148	146 to 152
Real estate 3/	87.7	83.0	80.5	78.4	80	79 to 83
Nonreal estate	66.0	65.6	65.5	66.6	68	66 to 70
Total farm equity	757.8	803.5	840.8	862.9	855	855 to 865
Percent						
Selected ratios:						
Debt-to-asset	16.9	15.6	14.8	14.4	14.7	14 to 15
Debt-to-equity	20.3	18.5	17.4	16.8	17.2	16 to 18
Debt-to-net cash income	277.8	258.7	245.7	234.6	256.1	270 to 280

P = preliminary, F = forecast. 1/ Includes real estate values not included in the 1987 Census of Agriculture and other ERS real estate series. 2/ Non-CCC crops held on farm plus value above loan rate for crops held under CCC. 3/ Includes CCC storage and drying facility loans.

Appendix table 8--Farm financial ratios: liquidity, solvency, profitability, and financial efficiency, 1987-92

Farm financial ratios	1987	1988	1989	1990P	1991F	1992F
<b>Liquidity ratios:</b>						
Household debt service coverage 1/	5.70	6.01	6.10	6.72	6.3	6.1 to 6.3
Farm business debt service coverage 2/	3.21	3.41	3.50	3.66	3.5	3.3 to 3.4
Debt servicing 3/	.13	.12	.12	.11	.1	.1 to .2
Times interest earned ratio 4/	3.99	4.11	4.76	4.90	4.3	4.3 to 4.4
<b>Solvency ratios:</b>						
Debt/asset 5/	18.7	17.4	16.5	16.1	16.4	16 to 17
Debt/equity 6/	23.0	21.1	19.8	19.1	19.6	19 to 20
<b>Profitability ratios:</b>						
Return on equity 7/	3.6	3.3	3.7	3.6	2.9	2 to 3
Return on assets 8/	4.8	4.5	4.8	4.6	4.0	3 to 4
Net farm to gross cash farm income 9/	24.1	23.7	27.9	27.3	22.9	23 to 25
<b>Financial efficiency ratios:</b>						
Gross ratio 10/	66.5	66.6	67.0	66.8	61.1	61 to 63
Interest to gross cash farm income 11/	8.8	8.3	7.9	7.4	7.4	7 to 8
Asset turnover 12/	22.1	21.8	22.1	22.1	21.6	21 to 22
Net cash farm income to debt ratio 13/	46.3	50.5	53.2	55.3	51.6	48 to 50
<b>Financial leverage index 14/</b>						
	.75	.73	.77	.77	.72	.6 to .7

P = preliminary, F = forecast. 1/ Assesses the ability of farm sector households to repay both principal and interest. 2/ Assesses the ability of farm businesses to repay both principal and interest. 3/ Indicates the proportion of gross cash farm income needed to service debt. 4/ Shows the farm sector's ability to service debt out of net income. 5/ Shows the proportion of all assets that are financed with debt. 6/ Measures the relative proportion of funds provided by creditors (debt) and owners (equity). 7/ Measures the ability of farm sector management to realize an adequate return on the capital invested by the owner(s). 8/ Measures how efficiently managers use farm assets. 9/ The profit margin indicates profits earned per dollar of gross income. 10/ Gives the portion of gross cash farm income absorbed by production expenses (claims on farm businesses). 11/ Gives the proportion of gross cash farm income committed to interest payments. 12/ Measures the gross farm income generated per dollar of farm business assets. 13/ Indicates the burden placed on net cash farm income to retire outstanding debt. 14/ Indicates whether the use of financial leverage is beneficial.

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